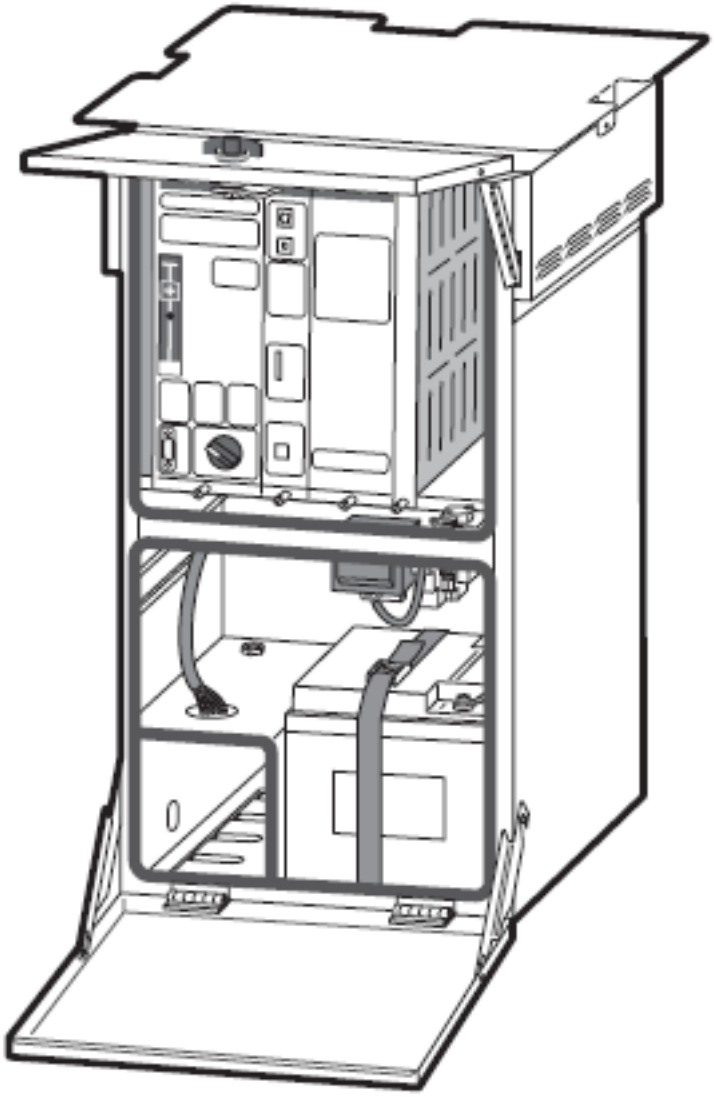
T200 P
MV Substation Control Unit

User Manual

46010-506-01
4/2012

Retain for future use.



Schneider Electric™

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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General Description

Safety Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This unit must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this unit before working on or inside the unit.
- Always use a properly rated voltage sensing device to confirm that the power is off.
- Replace all devices, doors, and covers before turning on power to this unit.

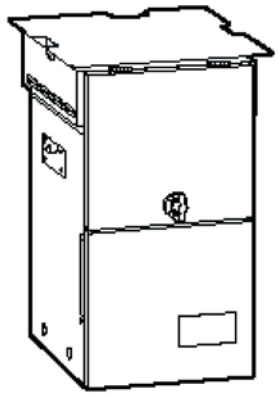
Failure to follow these instructions will result in death or serious injury.

1. Before working on or inside the unit, turn off all power supplying this unit.
2. Use a properly rated voltage sensing device to confirm that the power is off.

Functional Description

The Easergy T200 P unit is designed to be installed with overhead switches remotely controlled by the MV network. It contains all of the functions required to monitor and control one or two MV/LV switchgear devices.

Figure 1: 1 or 2-Channel Enclosure



The equipment is housed in a stainless steel enclosure designed for pole mounting by means of a U-bolt.

Management of the MV switch opening/closing electric control unit

The control is triggered by activation from the control station, by local operator control, or by internal automatic controls.

Measurement acquisition and processing

The T200 P unit can incorporate the following measurements and processing functions for each channel:

- Current measurement on each phase
- Calculation of the average load current
- Homopolar current measurement
- Single-phase or three-phase voltage measurement
- Measurement of the phase deviation between the upstream/downstream voltages for management of opening points
- Calculation of active and RMS power (option)
- Calculation of active energy (option)
- Calculation of the power factor (option)
- Frequency measurement

Monitoring, for the purposes of remote indication and/or local display, of MV substation and Easergy T200 P unit information

- Open/closed position of the MV switch
- Locked state of the MV switch
- Phase-to-phase or phase-to-ground event current detection
- Voltage present
- Automatic control On/Off position

- Door open
- Local/remote operating mode
- Immediate alternating supply voltage malfunction
- Time-delayed alternating supply voltage malfunction
- Charger fault
- Battery fault
- External 12 V power supply malfunction
- Motorization supply voltage malfunction

Logs

A time-stamped chronological listing of events and measurements. This information can be transmitted to the control center and archived in logs for reference and local downloading (in file form).

Automatic controls

- SEC (Sectionalizer): Automatic control for opening the MV switch following event detection in the source substation reset cycle.
- ATS (Automatic Transfer of Source): Automatic source changeover upon voltage loss detected on one of the channels.
- VT (Voltage Time): The detection of voltage loss (switch closed) causes channel opening and then reclosing when the voltage returns.

Backup power supply

The backup power supply provides—for all of the control unit components, the transmission equipment, and the switch motorization—a battery life of several hours in the event of an AC supply outage.

Local communication or communication with the remote control center

- One or two communication ports (option) are available for remote communication with the control center to manage two transmission channels. These ports can be used redundantly (normal/backup), for repeater, or maintenance applications. The ports use either modems integrated in the COM card or external equipment managed by the rack serial link.
- A choice of modem for each port, allowing any type of mounting:
  - Radio (600/1200 baud FSK or 1200/2400 FFSK)
  - PSTN isolated at 8 kV (300 to 14400 bits/s -V32 bis)
  - GSM/GPRS (dual-band 900 MHz–1800 MHz), SIM card accessible on the front panel
  - LL isolated at 8 kV (1200 baud FSK)
  - RS232 or RS485 isolated at 2 kV (19200 baud)

    NOTE: In an RS232 link, port 1 is replaced by the RS232 port integral with the COM card and is accessible via the RJ45 connector on the right of the rack.

  - Communication protocols for communication with the control center:

    IEC 870-5-101
    IEC 870-5-104
    DNP3, DNP3/IP
    Modbus™, Modbus/IP
    Other proprietary protocols (PID1, EDP, etc.)

— An Ethernet communication port is available for communication with the control center or for access from the local PC for consultation/configuration (Modbus IP protocol, IEC 870-5-104, DNP3 IP). This port is accessible on the front of the COM card.

— A USB communication port is available for communication with the local PC for consultation/configuration. This port is accessible on the front of the COM card.

Communication with local equipment (option)

Optionally, a Modbus RS485 communication port (2 wires, isolated at 2 kV) is available for dialog with equipment communicating with the T200 P unit (e.g., Sepam).

Time synchronization of the equipment

Time setting for event dating can be performed by:

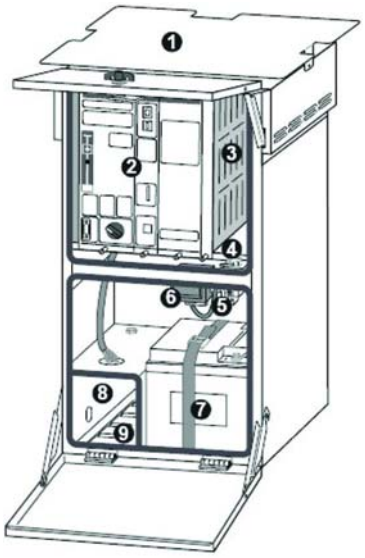
- the laptop PC for consultation/configuration of the T200 P unit (manually or automatically via the PC time);
- the control center (if the protocol permits);
- GPS sync (option). With this option, the minimum precision of time setting is approximately 50 ms;
- SNTP sync (option) from an Ethernet network. With this option, the precision of time setting is approximately one second.

Description of Equipment

The equipment is housed in a 316L stainless steel enclosure which provides:

- resistance to mechanical stresses;
- resistance to environmental stresses;
- compliance with EMC standards.

Figure 2: The Enclosure



The enclosure is fitted with a key locking system. Its main parts are:

1. A sun screen restricts the influence of high external temperatures;
2. A 6-unit rack contains all of the electronic modules;
3. Transmission equipment (radio, external modem, etc.);
4. A door switch;
5. A lever type fuse holder for the AC power supply;
6. A transformer for voltage measurement acquisition;
7. A battery serves as a backup power supply when the enclosure is no longer powered by the AC supply;
8. A "connection" part links the motorization units and the current transformer sensors;
9. An anti-intrusion guard plate under the enclosure protects against any malevolent attempt at disconnection of the "connection" part cords.

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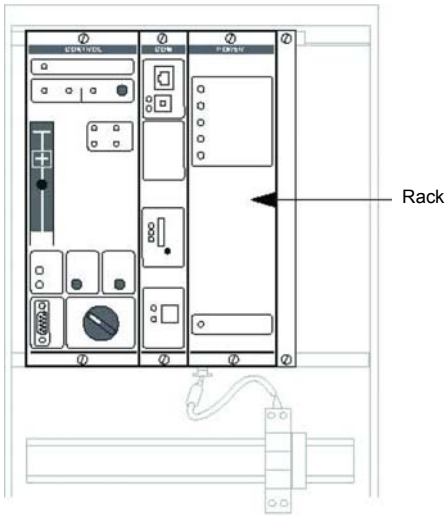
Figure 3: The Rack



The rack contains three functional modules:

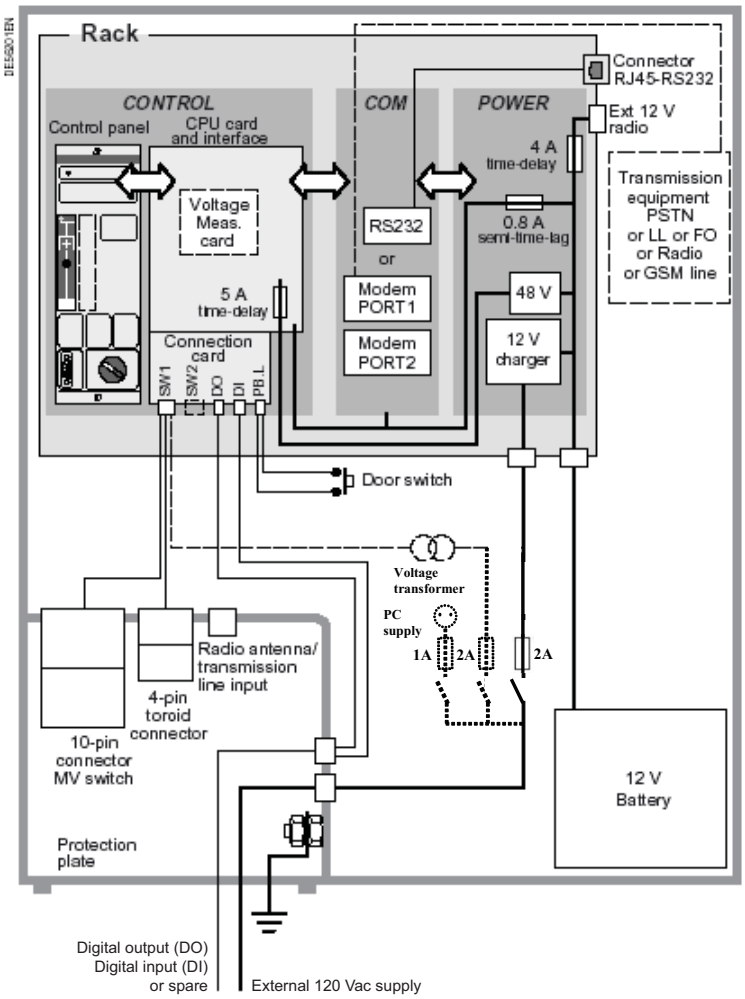
- The Control module (marked CONTROL) manages the overall operation of the T200 P unit and the exchange of information with the power supply and communication modules. This module has several functions:
  - Interfacing with, monitoring, and control of the MV switchgear;
  - Automatic control management;
  - Event detection on the MV line;
  - Voltage loss detection;
  - Calculation of power (P, S, Q), energy, power factor, frequency;
  - Local operation.
- The Communication module (marked COM) serves as an interface between the cards of the control module—the local equipment communicating via Modbus and the control center. It centralizes, processes, and archives information and transmits it in accordance with the communication protocol adopted.
- The Power Supply module (marked POWER) supplies power to the enclosure, the battery charger, and associated self-monitoring equipment.

T200 P Unit Block Diagram

NOTE: The various modules are connected by a "rack backplane card" (not shown in this diagram).

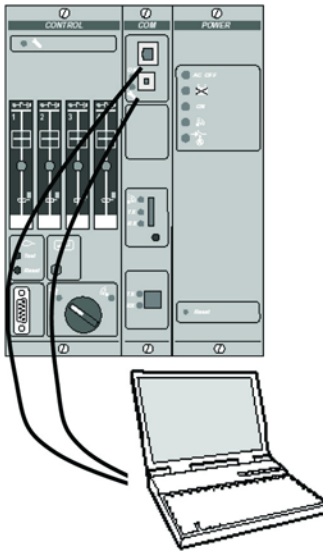
Refer to the T200 P Installation Manual, 46010-502-01, supplied with the equipment, to obtain information concerning installation of the T200 P enclosure.

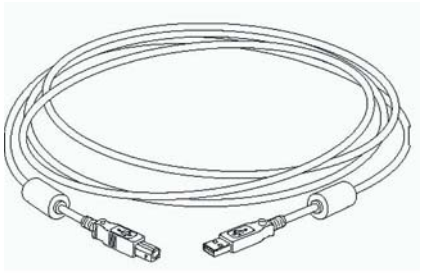
Figure 4: T200 P Unit Block Diagram



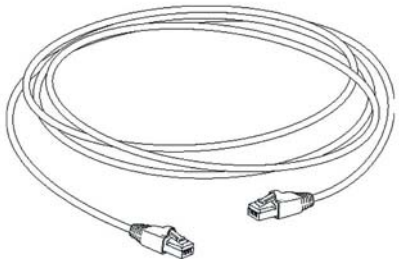
Connecting to the T200 P Unit

Figure 5: Connection to the T200 P Unit





Type A connector Type B connector
USB cable



"Cross-over" or "straight-through" Ethernet cable depending on type of link access

The Easergy T200 P unit must be configured from a configuration PC. This is performed from the COM card (single access). It allows configuration of:

- CPU card parameters (date, data, etc.)
- COM card parameters (communication parameters, alarms, etc.)
- System parameters (variable management, class management, etc.)

Equipment required for the T200 P unit connection

For testing-maintenance configuration, the T200 P unit requires:

- A microcomputer operating under Windows® 2000 or XP exclusively and including Internet Explorer® (version 5.5 or 6.0).
- A USB port on this PC to perform connection with the T200.

An Ethernet port (RJ45) is available on the COM card for remote access to the T200 P unit from an Ethernet network. This port can also be used to connect the T200 P unit with the PC. The Ethernet cable required for Ethernet network-T200 P connection or PC-Ethernet network connection is the "straight-through" type. The Ethernet cable required for PC-T200 P connection is the "cross-over" type. The USB cable required for PC-T200 P connection is USB-A type at one end and USB-B at the other.

A CD-ROM is supplied to the user for:

- Installation of the USB driver for connection with the T200.
- Installation of Java® Runtime Environment 5.0 needed for port trace operation (Supervisor-T200 P frame analysis).

NOTE: TCP/IP ports 1168, 1169, and 1170 must be accessible on the PC for trace operation. Contact the network administrator if it is necessary to alter the PC or network configuration to deactivate the firewall on these ports. Configuration of the T200 P unit is performed directly from Internet Explorer. Apart from Java Runtime 1.5, no other additional software is needed to access the T200 P testing/maintenance configuration operations.

Principle of the T200 P embedded server

The T200 P unit includes an embedded server which is initialized automatically as soon as connection is established with the T200 P unit. The data displayed by the T200 P unit through this embedded server appears in the form of HTML pages.

Various pages and sub-pages can be accessed by the user depending on the rights available to him. The HTML pages displaying the information managed by the T200 P unit are refreshed in real time so as to update the latest states.

Access and connection are secured by a Login and password. Several levels of access to the HTML pages can be configured, provided one has the required rights.

From the embedded server, it is possible to:

- Configure the detector, communications and automatic control parameters, or system parameters (management of variables, classes, rights, etc.);
- View the states managed by the T200 P unit (TSS, TSD, routine faults, telemeasurements, etc.);
- Save or load the T200 P parameter configuration from files already backed up on the PC;
- Send remote control orders to the T200 P unit;

- Transfer diagnostic logs in the form of Excel-compatible files;
- Load a new software version of the T200 P application.

The embedded server can be accessed both by the USB port and by the Ethernet port. There is no difference in operation according to the type of port used.

Initialization of connection to the T200 P unit

Default, the T200 P unit incorporates IP addresses necessary for local connection from a PC. Addresses must be known in advance in order to start a connection. These addresses are indicated on the COM card:

Port	Default Address on the T200 P Unit
USB	212.1.1.10
Ethernet	172.16.0.5

NOTE: The USB address cannot be modified by the user. The Ethernet address can be modified, if the rights permit, to correspond to the local area network, which does not necessarily use the same network addresses and masks.

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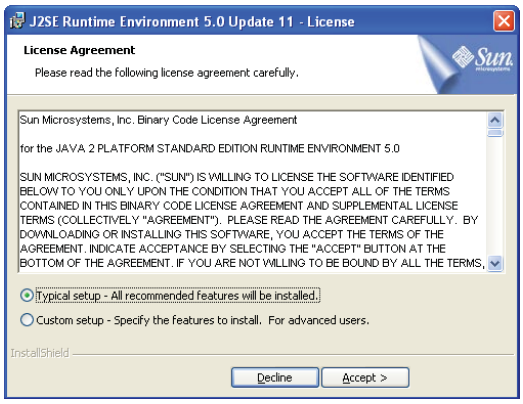
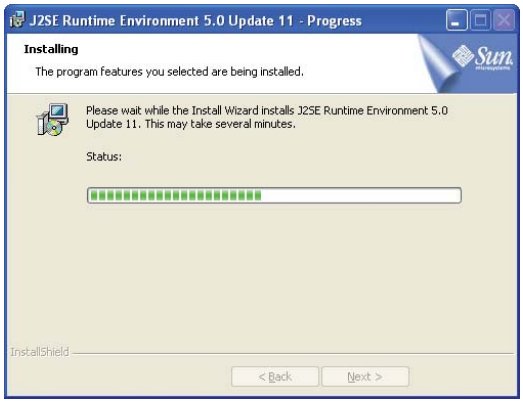
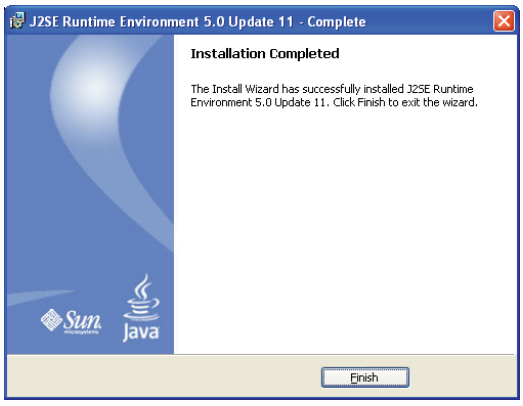
Connection Steps

Step 1. Installing Java Runtime Environment 5.0

Figure 6: Installing Java Runtime







A. Insert the CD-ROM supplied with the T200 P unit into the PC drive.
B. Double-click the "jre-1_5_0_11-windows-i586-p-s.exe" installation file. (Located on the CD-ROM in folder: D:\Tools\Java)
C. Software installation begins; click "Standard installation…" and "Accept."
D. If prompted to install Google options, deselect "Google Toolbar" and "Google Desktop" then click "Next."
E. After installation is complete, click "Terminate."

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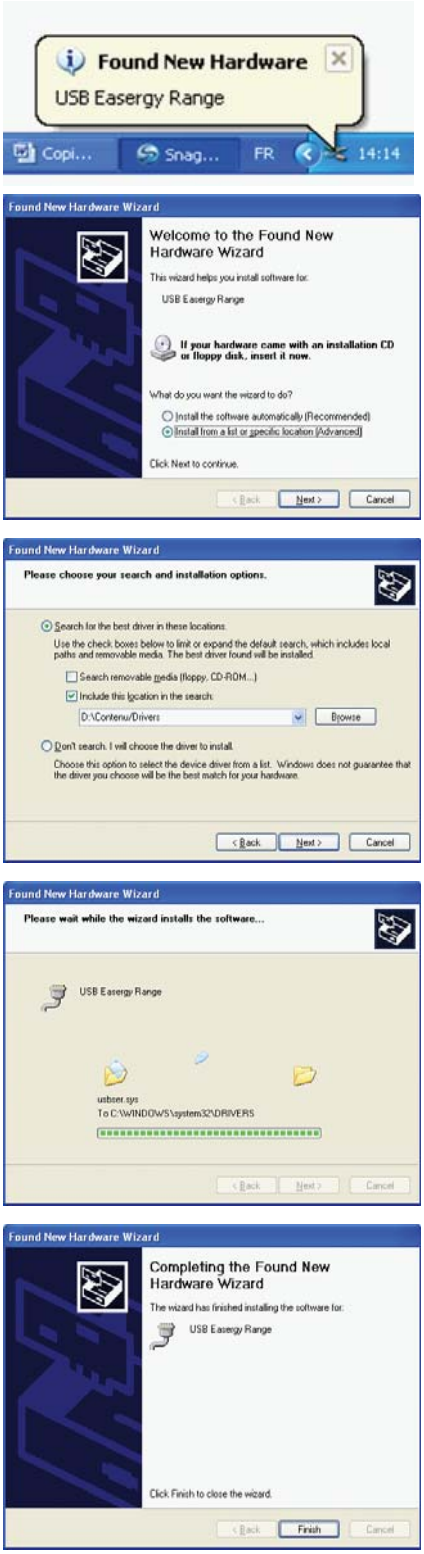
Step 2. Installing the USB Driver

Figure 7: Installing the USB Driver



NOTE: For the T200 P link via Ethernet, steps 2 and 3 are not necessary. Go to step 5.

At first connection with the T200 P unit via the USB port, the Windows interface detects the new hardware and asks you to install the driver.

Under Windows 2000

A. Select "Search for an appropriate driver…."
B. Select "Specific location."
C. Indicate "D:\Content\Drivers" as the corresponding driver access path in the search location.
D. Insert the CD-ROM supplied with the T200 P unit, then click "Next."
E. After the driver is detected, continue with installation.

Driver installation takes place automatically and ends with the "Installation Completed – USB Easergy range" screen. The driver is installed.

Under Windows XP

A. Do not authorize the Windows interface to connect to "Windows Update."
B. Select "Install from a list or a specified location…."
C. Select "Search for the best driver in this location" and "Include this location in the search."
D. Indicate "D:\Content\Drivers" as the corresponding driver access path in the search location.
E. Insert the CD-ROM supplied with the T200 P unit, then click "Next."
F. The Windows interface automatically detects the "USB Easergy range" driver.
G. The Windows interface indicates that the driver is not validated. Continue with installation.

Driver installation takes place automatically and ends with the “Installation Completed – USB Easergy range" screen. The driver is installed.

NOTE: Always use the same USB port on the PC for connection to the T200 P unit to avoid having to reinstall the driver on another port.

NOTE: Step 2 is no longer necessary after the first connection performed with the T200 P unit. Go to step 5.

Step 3. Creating the USB Local Area Network (LAN) Connection

Figure 8: Installing the USB Driver

NOTE: For the T200 P link by Ethernet, steps 3 and 4 are unnecessary. Go to step 5.

Once the USB driver has been installed, a remote network connection must be created for the USB link (this is not necessary for the Ethernet link).

With Windows 2000

A. Click the Windows "Start" button.
B. Click "Settings."
C. Click "Network connection and remote access."
D. Click "Establish a new connection."
E. Select "Connect directly to another computer."
F. Select "Guest."
G. Select the last COM port created on the PC corresponding to "Communication Port (COM X)."
H. Select "For all users."
I. Name the USB network connection, for example "T200 P Connection."
J. When the connection window is displayed, there is no need to give a user name and login password. Click the "Log in" option.

The USB connection between the PC and the T200 P unit is initialized. A USB connection status icon appears in the Windows toolbar.

NOTE: For easy access, create a shortcut for the "T200 P Connection" USB network connection and place it on the desktop of your PC.

With Windows XP

A. Click the Windows "Start" button.
B. Click "Control Panel."
C. Click "Network connections."
D. Click "Create a new connection."
E. Select "Set up an advanced connection."
F. Select "Connect directly to another computer."
G. Select "Guest."
H. Name the USB network connection, for example, "T200 P Connection."
I. Select the last COM port created on the PC corresponding to "Communications Port (COM X)."
J. Select "All users."
K. Click "Add a shortcut to this connection to my desktop."
L. Click "Terminate."
M. When the connection window is displayed on screen, there is no need to give a user name and login password. Click the "Log in" option.

The USB connection between the PC and the T200 P unit is initialized. A USB connection status icon appears in the Windows toolbar.

NOTE: Steps 3 and 4 are unnecessary after the first connection performed with the T200. Go to step 5.

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Step 4. Creating the PSTN or GSM Remote Network Connection

Figure 9: Creating the PSTN or GMS Remote Network Connection

Perform this step only if the T200 P unit includes a GSM or PSTN (telephone) internal modem installed on the COM card. This connection may operate with an external PSTN or GSM modem, depending on the modem used.

NOTE: It is not necessary to create this type of connection for the GPRS link.

With Windows 2000

A. Click the Windows "Start" button.
B. Click "Settings."
C. Click "Network connection and remote access."
D. Click "Establish a new connection."
E. Click "Connection to a private network."
F. From the list of peripherals displayed, select the one that corresponds to the modem to be used for connection.
G. Enter the phone number of the T200 P unit to be contacted (this number may be changed later, at each connection attempt).
H. Select "For all users."
I. Name the telephone connection to the T200 P unit, for example, "T200 P remote connection."
J. When the connection window is displayed, there is no need to give a user name and login password. Click "Dial."

The PSTN or GSM remote network connection between the PC and the T200 P unit is initialized between the two devices. A modem connection status icon appears in the Windows toolbar.

With Windows XP

A. Click the Windows "Start" button.
B. Click "Control Panel."
C. Click "Network connections."
D. Click "Create a new connection."
E. Select "Connect to the network at my workplace."
F. Select "Dial-up connection."
G. From the list of peripherals displayed, select the one that corresponds to the modem to be used for telephone connection to the T200 P unit.
H. Name the telephone connection created, for example, "T200 P remote connection."
I. Enter the phone number of the T200 P unit to be contacted (this number may be changed later, at each connection attempt).
J. Select "Do not use my smart card."
K. Select "All users."
L. Select "Add a shortcut to this connection to my desktop."
M. Select Terminate."
N. When the connection window is displayed, there is no need to give a user name and login password. Click "Dial number."

The PSTN or GSM remote network connection between the PC and the T200 P unit is initialized between the two devices, and a modem connection status icon appears in the Windows toolbar.

NOTE: Step 4 is no longer necessary after the first connection performed with the T200. Go to step 5.

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Step 5. Connecting with the T200 P Unit

This section details the steps to gain local or remote access with the T200 P unit using various types of ports for connection.

Local Access via the USB Port

Figure 10: Local Access via the USB Port

A. The T200 P unit being powered up without a "Fault" indicator lamp lit on the COM card, connect the USB cable to the PC and to the COM card.
B. Start the USB remote network connection created earlier (see Step 3).
C. Click "Connect", and the connection is established.
D. Start Internet Explorer.
E. Enter the IP address (212.1.1.10) in the "Address" field and click OK.
F. The home page of the embedded server appears on screen.
G. Define the language to be used.
H. Enter a "User name" and a "Password" (default: "Easergy", "Easergy") and click OK.

Access to the HTML pages is activated according to user access rights.

Powering up or resetting the T200 P unit

After powering up or resetting the T200 P unit, it is important to wait for completion of initialization of the COM card before connecting the USB cable, otherwise the connection may not work. When the T200 P unit is powered up, the red "Fault" indicator lamp should flash for approximately 5 seconds and then stay lit steadily for 1 second before going out. Wait until COM card initialization is complete before connecting the USB cable.

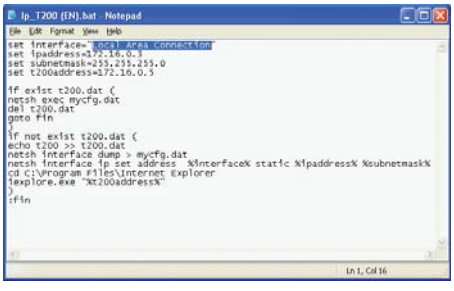
Stopping the USB connection to the T200 P unit

To stop the USB connection to the T200, the following operations should be performed, in order:

A. Stop the T200 P connection by double-clicking the "T200 P Connection" shortcut on the PC desktop, and then clicking the "Disconnect" option.
B. Disconnect the USB cable from the PC and the T200.

Local access via the Ethernet Port

Figure 11: Local Access via the Ethernet Port



To gain local access via the Ethernet port, perform the following steps:

A. With the T200 P unit powered up, connect the PC to the Ethernet connector of the COM card on the T200 P unit using the appropriate cable (cross-over cable).
B. Open the Windows "Control Panel", then open "Network connections."
C. Note the name marked in the "Name" column corresponding to the "Local Area Connection" in the "Type" column.
D. Insert the CD-ROM supplied with the T200 P unit into the PC drive.
E. Copy the file "Ip_T200.bat" onto the hard disk of your PC (e.g., to C:\).
F. Open the file "Ip_T200.bat" on C:, using Windows Notepad.
G. Recopy the name of the network connection in the "Ip_T200.bat" file, following the "set interface=" indication.
H. Save the file, then double-click the file "Ip_T200.bat."
I. Internet Explorer starts with the T200 P automatic connection, reallocating the PC's Ethernet connection parameters for correct operation of the connection with the T200 P unit.
J. The home page of the embedded server is displayed.
K. Define the language to be used.
L. Enter a "User name" and a "Password" (default: "Easergy", "Easergy") and click OK.

Access to the HTML pages is activated according to user access rights.

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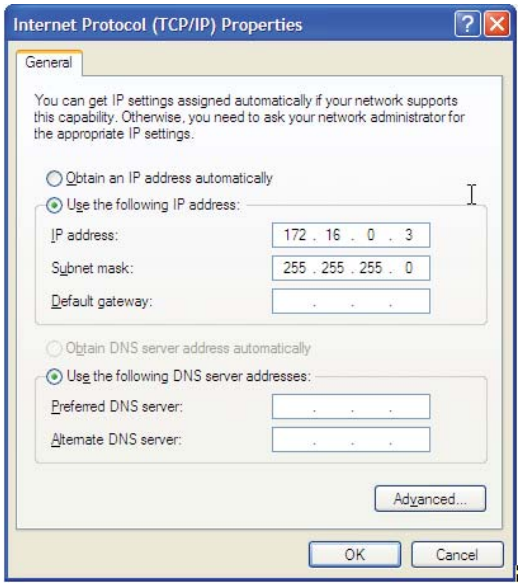
Windows "Notepad" does not manage accented characters. If the name of the Windows local area connection contains accented characters, this connection should be renamed in Windows and in the file "IP_T200.bat", to replace the accented characters with non-accented characters.

NOTE: Once connection with the T200 P unit is complete, click again on the file "Ip_T200.bat" to retrieve the previous PC settings concerning the Ethernet connection.

Figure 12: Alternative Local Access via Ethernet Port



Another method to gain local access via the Ethernet port

A. In the Windows Control Panel, click with the right mouse button on "Connection to local area network" to be found in the "Network Connections" directory.
B. Click "Internet Protocol (TCP/IP)."
C. Click "Properties."
D. Check "Use the following IP address" and manually enter the following items:
   IP address = 172.16.0.3
   Subnet mask = 255.255.255.0.
E. Click OK.
F. Start Internet Explorer.
G. Enter the IP address (172.16.0.5) in the "Address" field and click OK.
H. The home page of the embedded server is displayed.
I. Define the language to be used.
J. Enter a "User name" and a "Password" (default: "Easergy", "Easergy") and click OK.
K. Access to the HTML pages is activated according to user access rights.

NOTE: Once connection with the T200 P unit is complete, restore the original IP address configuration settings of the PC.

Remote Access via a Local Ethernet Network or a GPRS Network

A. With the T200 P unit powered up, connect the PC and the T200 P unit to the local Ethernet network using appropriate cables (straight Ethernet cables).
B. Start Internet Explorer.
C. Enter the IP address of the T200 P unit corresponding to the Ethernet or GPRS access in the "Address" field and click OK.
D. The home page of the embedded server is displayed.
E. Define the language to be used.
F. Enter a "User name" and a "Password" (default: "Easergy", "Easergy") and click OK.

Access to the HTML pages is activated according to user access rights.

NOTE: Generally the default IP address of the T200 P unit cannot be used on the Ethernet or GPRS network employed, and it must be replaced, in the T200 P unit's specific IP address configuration page, with an address acceptable for the network (see “Configuration of Ethernet Interfaces” on page 33). Access the T200 P unit's IP address configuration page using the USB local connection.

NOTE: Unlike Ethernet access, the connection speed on a GPRS link is relatively slow (maximum connection speed = 57600 baud). A GPRS connection the T200 P unit automatically displays the pages of the Web server in simplified mode (Web server configuration in "Remote" mode). It is possible to return to a standard display by clicking "Local" configuration, at the top of the Web server home page.

Remote Access via Telephone or GSM Link

This access operates only when the T200 P unit includes a GSM or PSTN (telephone) internal modem installed on the COM card. When an external modem is used, it is possible that this access may operate, but that depends on the modem used.

A. Start the GSM-PSTN remote network connection created previously (see Step 4).
B. Click "Dial number" to start remote network connection.
C. Once a connection is established, start Internet Explorer.
D. In the address field of Internet Explorer, enter one of the following IP addresses, depending on the port number on which the RTC or GSM modem is installed on the T200 P unit:
   — For port 1: 212.1.0.1
   — For port 2: 212.1.0.3
E. The home page of the embedded server is displayed.
F. Define the language to be used.
G. Enter a "User name" and a "Password" (default: "Easergy", "Easergy") and click OK.

Access to the HTML pages is activated according to user access rights.

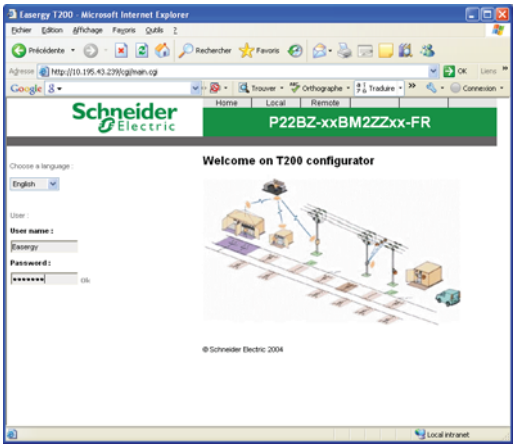
NOTE: Unlike a standard USB or Ethernet access, the connection speed on a telephone link is slow (9600 baud). A PSTN or GSM connection the T200 P unit automatically displays the pages of the Web server in simplified mode (Web server configuration in "Remote" mode). It is possible to return to a standard display by clicking "Local" configuration, at the top of the Web server home page.

Step 6. Overview of the Embedded Web Server of the T200 P Unit

Once access to the embedded server has been identified by user name and password, all of the HTML pages can be accessed by tabs or by the associated drop-down lists when they are available:

NOTE: Details of the settings for each page are given in “Appendix A— Configurable Parameters” on page 95.

Figure 13: Home Page



Home Page

This page is displayed at connection to the T200 P unit. It enables definition of the language to be used for displaying the pages. It also allows definition of user access rights by user name and password. The user names and passwords that can be accessed depend on the configuration defined in the Maintenance page and the Users sub-menu.

By default, the "Easergy" user name and "Easergy" password allow access as "Administrator" to the embedded server.

A incorrect user name or password automatically opens access in "Monitoring" mode.

Clicking the "Remote" option, at the top of the page, makes it possible to log on to the T200 P web server with a simplified display of information (without images or logos) in order to optimize data transfer times. This mode is used automatically for slow remote network connections (PSTN or GSM at 9.6 Kbits/s).

Clicking the "Local" button, at the top of the page, makes it possible to log on to the T200 P web server with a normal display (all logos and images are transferred and displayed). This mode is used automatically for high-speed local area connections: USB (115.2 Kbits/s) or Ethernet (100 Mbits/s).

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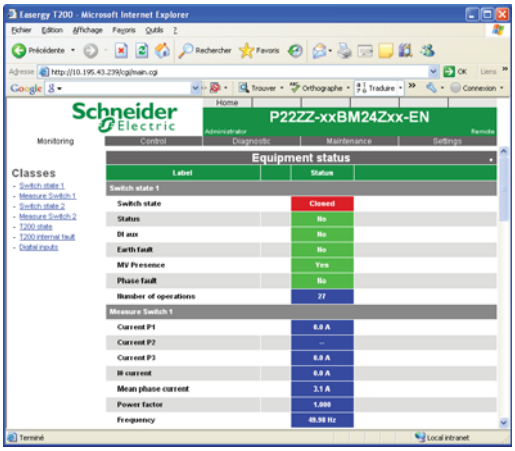
Figure 14: Monitoring Page



Monitoring Page

This page can be used to consult the T200 P unit states:

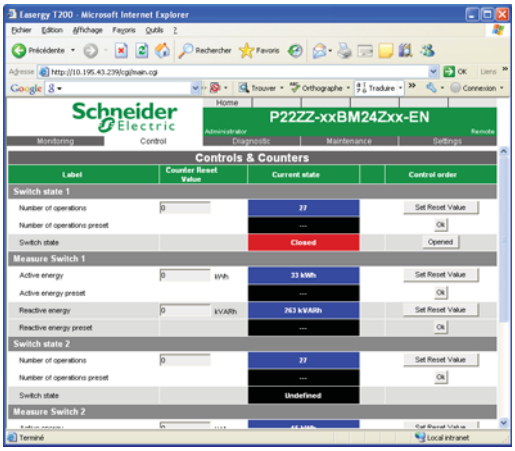
- TSS: State of digital inputs, T200 P internal faults, voltage presences, current presences, etc.
- TSD: open or closed state of switch, automatic control, digital outputs
- TM: measurements of currents, voltages, frequency, etc.
- Counters: number of operations or energy.

Some displayed data is calculated and deduced by the T200 P unit:

- Active, reactive, apparent power.
- Phase difference between channels (deduced from the phase 1 voltages of each channel).
- Power factor or Cos Φ.
- Active power.
- Neutral and average current (neutral current deduced in the case of a type A arrangement: 3-phase current transformers).
- Phase-to-phase or phase-to-ground voltage (3-wire arrangement: phase-to-phase voltages measured and phase-to-ground voltages deduced. 4-wire arrangement: phase-to-ground voltages measured and phase-to-phase voltages deduced).

The Monitoring page is displayed by class (e.g., State of channels, System, Automatic Control, etc.). Each class covers a category of information to facilitate viewing on screen. The states of the indications or measurements are automatically refreshed every 3 seconds. The presentation, quantity of data displayed, and content of this page may vary from one application to another.

Figure 15: Control Page



Control Page

This page allows local control orders to be sent from the PC to:

- The switches (change of position by CO/CF);
- The operation and energy counters (counter initialization);
- The automatic controls (switching On/Off);
- The digital outputs (forced setting open or closed);
- The fault detector (fault memory resetting).

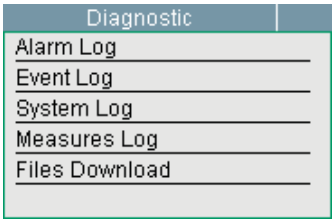
The T200 P unit must be in "Remote" mode to be able to send control orders. The control orders on the TSDs make it possible to go to the state complementing that displayed by the T200. The control orders on the counters enable them to be initialized at a value predefined by the user.

For security reasons, each control order must be confirmed by the user.

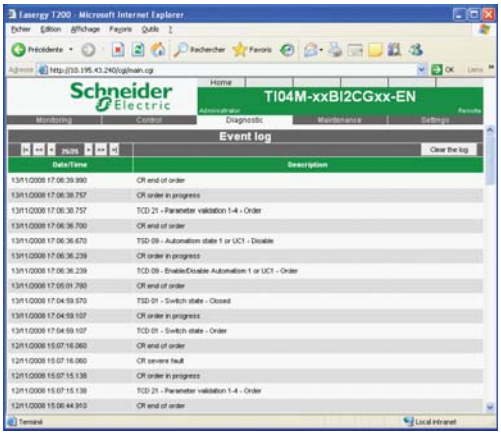
The state of a control order in progress is displayed in orange (default color). The state of the control order is refreshed on screen automatically as soon as it is completed.

NOTE: The colors of the states displayed can be modified by configuration.

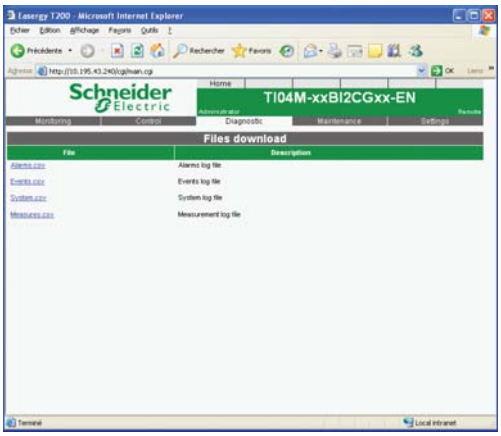
Figure 16: Diagnostic Pages



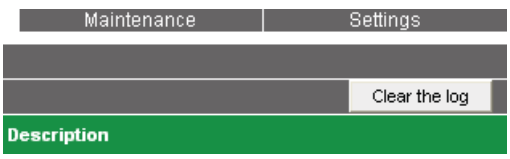
Drop-down list



Event log



File download



Diagnostic Pages

These pages allow consultation of the logs recorded in real time by the T200 P unit. The event time stamping is 1 ms.

Each log allows consultation of the history of states occurring on the T200 P unit with a description of the states. All information present in the logs is time-and-date stamped by the T200 P unit's internal clock.

The logs are as follow:

- Alarm log: (storage capacity: 2000)

  Alarms can be generated and transmitted spontaneously to the control center after an information change of state, provided that this state has been configured as alarmed. A box associated with each alarm is checked when the control center has acknowledged this alarm.

  NOTE: Information configured as alarmed automatically implies the generation of an associated event (in the event log or measures log depending on type).

- Event log: (storage capacity: 10000)

  Every change of state generates an event, provided that the use of events for this state has been configured.

- System log: (storage capacity: 6000)

  The equipment also incorporates a function for recording additional information to facilitate operation and maintenance.

  — Storage of transmission events (to determine the origin of a recurring communication error);

  — Indication of transmission errors (CRC error, collisions, PSTN line out of order, switchover to redundancy, etc.);

  — Indication of system events (T200 P unit start-up/reset, change of configuration, etc.).

- Measures log: (storage capacity: 30000)

  The measurements managed by the T200 P unit (phase current or mains voltage) can be saved in a log, provided that their use has been configured. The measurements can be recorded in several ways:

  — Periodically (sampled or averaged value with configurable period);

  — Upon exceeding a threshold (configurable high or low threshold);

  — Upon variation or "dead band" (configurable variation %);

  — Upon periodic recording of minimum and maximum values (configurable values and period).

  For all of the logs, when the storage capacity is reached, the most recent event occurring erases the oldest event on the list.

- A Files download sub-menu allows these logs to be saved to the PC in the form of Excel-compatible files (*.csv files). These files can be consulted or transferred, to enable the establishment of statistics or reviews.

  An "Empty log" button in each log can be used to empty their content, erasing all of the information saved previously.

Principle of saving to logs:

To increase the life of the flash memory, saving to the logs is performed every 5 minutes.

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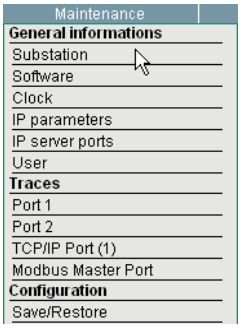
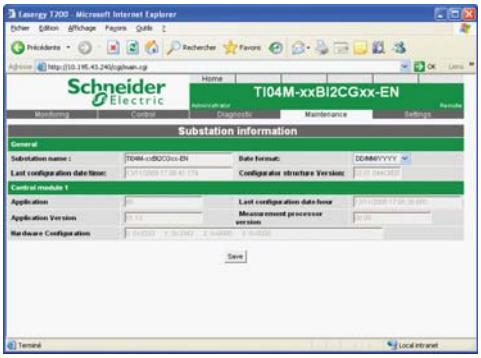
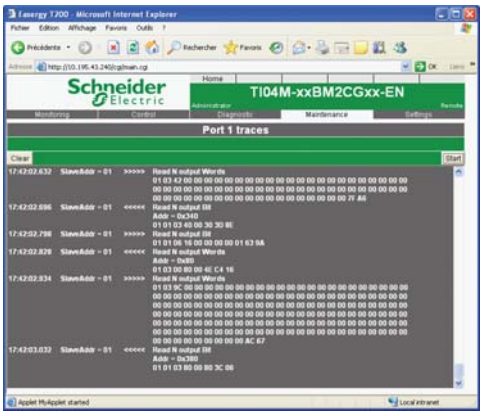
Figure 17: Maintenance Pages



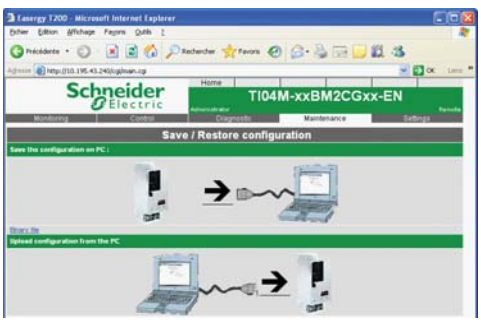
Drop-down list



Substation information



Port trace



Saving/backup

Accordingly, when a reset is performed on the T200 P unit, it is possible that the most recent events that have occurred since the last backup may not be saved in the logs. The only exception is when general shutdown occurs on the enclosure. In that case, even if the time elapsed is less than 5 minutes, the T200 P unit saves the events to the logs before turning off the power supply.

CAUTION

PERMANENT LOSS OF CONFIGURATION

- After a change of configuration, it is important to wait 15 seconds (the time needed for the equipment to store the parameters in memory) before performing a reset on the equipment.
- Open the program to verify that the new program was saved.

Failure to follow these instructions can lead to equipment damage.

Maintenance Pages

Several pages can facilitate maintenance of the T200 P unit, by giving information or allowing configuration of the T200 P application:

- **General information:** Specific sub-pages provide information concerning the T200 P application, namely:

  Substation page: information concerning the current application (version number of the application and fault detector, date and time of last configuration, name of substation, etc.).

  Software page: information concerning the software used by the T200 P unit (version, date and time of compilation, size, and CRC32).

  The T200 P unit is capable of storing two different software versions in memory. It is possible to switch from one software version to another by selection (if two versions are available). It is also possible to load a new software version from a file available on the PC, from a floppy disk, or CD-ROM.

  NOTE: The loading process manages only the file format with .zip extension. The software must not be unzipped before loading it on the T200 P unit (files with .mem extension are not managed).

  NOTE: When loading software on the T200 P unit, one in fact loads the protocol used for remote transmission but also all of the equipment operating options, including some that are managed and displayed by the Web server if configured and/or detected physically on the COM card, namely: the Modbus master function, the function of synchronization by GPS, and the digital input counting function.

  Clock page: Allows the T200 P unit's date and time to be configured manually or automatically from the time on the PC. Clicking "Update" causes the manual change of date and time to be accepted. Clicking "Synchronization" allows the PC date and time to be taken into account automatically for configuration on the T200 P unit.

  NOTE: This configuration is possible only if synchronization by SNTP server or by GPS module is not installed in the T200 P unit.

  IP parameters page: Allows consultation or where applicable configuration of the Ethernet and USB interface parameters (IP addresses, sub-network masks, etc.). When a GPRS modem is installed

NOTE: It is dangerous to modify the Ethernet IP parameters, with a risk of no longer being able to access the T200 P unit. Only system managers can modify these parameters.

on the COM card, this page also allows consultation of the IP addresses assigned automatically by the GPRS server.

IP server ports page: allows redefinition of the port numbers used by the T200 P unit for COM card access, in the event that the transmission network does not accept the default numbers (e.g., restriction on certain GPRS operators). By default, the following port numbers are configured on the T200 P unit:

- HTTP server port = 80
- Telnet server port = 23
- Port 1,2 and TCP/IP trace server port = 1168, 1169 and 1170
- TCP/IP port trace server port = 1170

This page is optional depending on the embedded software in the T200 P unit (e.g., present page for software including GPRS transmission).

NOTE: If the HTTP port number is changed in this page, to be able to log on to the T200 P web server again, it is essential to add the port number at the end of the T200's IP address preceded by a colon (e.g., 10.207.154.239:1500 for a T200 P unit access on port 1500).

User page: Allows creation, modification, or deletion of users and management of rights (login, password, access rights).

- **Port 1, 2 and TCP/IP, Modbus Master traces:** The "Port 1, 2 and TCP/IP traces" pages allow viewing, for each available port, of communication exchanges between the control center and the T200 P unit. The "Modbus Master trace" page allows viewing of exchanges between the T200 P unit and the Modbus slaves of the substation (see additional manual NT00121-xx).

  This trace is displayed on screen in decoded form to facilitate reading of the frame's content:

Column 1	frame time-and-date stamping (in hour:minute:second.thousandth of second format)
Column 2	direction of dialog, RTU → PC or PC → RTU, with associated address numbers of the PC and RTU
Column 3	hexadecimal frame + brief description of the content of the frame

- **Configuration:**

  Save/Restore page: Allows all of the current T200 P unit's configuration parameters to be saved to a file.

  The T200 P unit's configuration parameters, from a backup or from another substation, can be loaded to a file on your PC, to a floppy disk, or CD-ROM. This file can be used to configure one or more other substations in the same way without having to reconfigure all of the parameters.

  NOTE: During loading from a file, the data integrity is verified automatically to ensure the compatibility of application versions.

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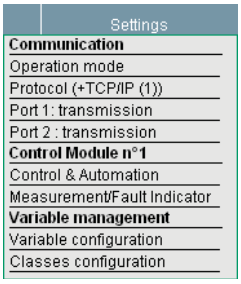
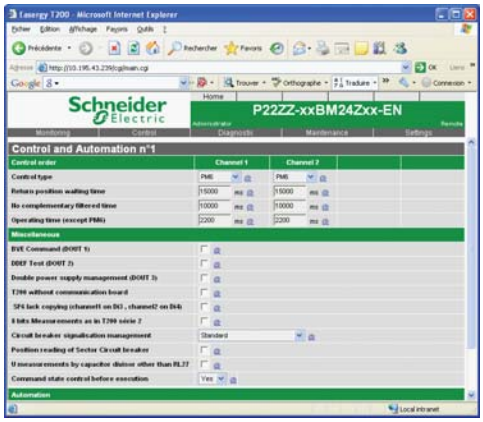
Figure 18: Settings Pages



Drop-down list

Protocol parameters



Control and automation

Measurements and data

Settings Pages

Configuration of the T200 P unit is performed from pages grouped together in several different categories:

- **Communication:** These pages allow you to configure the specific communication parameters of the T200 P unit:

  Operation Mode page: For each communication port available on the T200 P unit, it is possible to determine:

  The protocol available;
  The type of transmission medium to be used (Radio, PSTN, GSM, etc.);
  The way in which the ports will be managed, according to one of the available modes:

  – Not used
  – Normal
  – Balanced – Normal/Backup
  – Main – Normal/Backup
  – Backup – Normal/Backup
  – Store & Forward

  Protocol + TCP/IP Protocol pages: These pages are used to configure the parameters specific to the protocol used:

  – Maximum number of send operations,
  – Collision avoidance system,
  – Configuration of link addresses,
  – Frame size, etc.

  NOTE: Each type of protocol has its specific configuration page. For more details, refer to the specific user manual for the protocol installed on the T200 P unit.

  Ports 1 & 2 transmission page: This page is used to configure the parameters of the communication port (modem):

  – Baud rate (e.g., 19200 baud),
  – Parity, stop bit, etc.,
  – Time-out management (e.g., RTS-CTS, CTS-message), etc.

  NOTE: The parameters displayed in this page depend on the type of transmission medium configured in the Operating modes page.

  Modbus Master Port and Slave Configuration page: These menus can be used to configure communication with Modbus slaves. The parameters setup for communication with Modbus slaves is covered by additional documentation (NT00121-xx).

- **Control Module No. x:** Some parameters of the T200 P unit are managed for each Control module. Two pages allow this configuration:

  Control and Automation page: This page can be used to configure the parameters related to electrical control of the switch and automation management:

  – Type of switch (Standard, PM6, CI2 or other),
  – Change-of-position waiting time,
  – Type of automatic control, etc.

  Measurements/Fault Detector Page: This page allows configuration of all of the T200 P analog information, namely:

  – Mains frequency,
  – Current and voltage measurement parameters,
  – Data parameters, etc.

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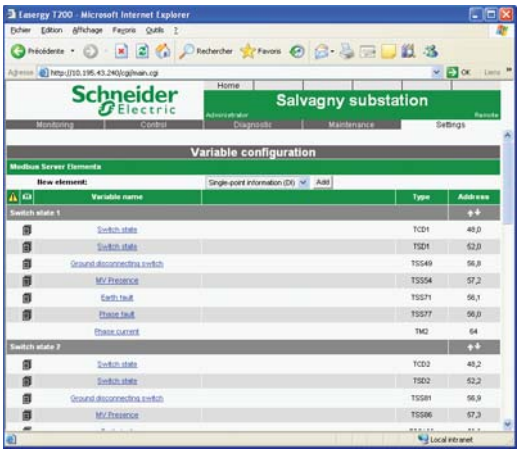
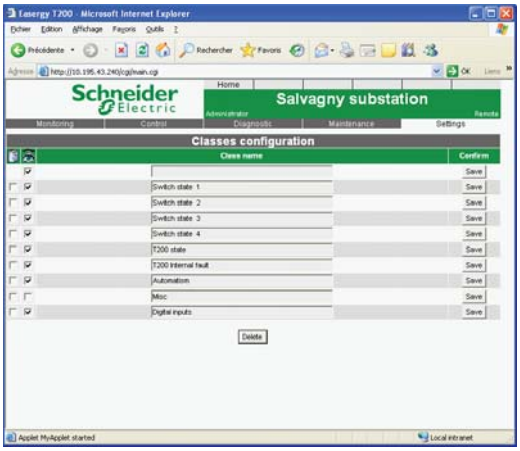
Figure 19: Variable Management



Variable configuration



Classes configuration

Label		Status
Switch state 1		
Switch state		Closed
Status		No
DI aux		No
Earth fault		No
MV Presence		Yes
Phase fault		No
Number of operations		27

Example of variables associated to a class
Excerpted from the page: “Monitoring”

- **Variable management:** All of the information managed by the T200 P unit must be configured separately to define its operation and how it will be managed by the embedded server:

  Variable configuration page: The complete list of information (variables) managed by the T200 P unit is displayed in this page, under various categories. Depending on the type of variable, the configuration page and the parameters displayed may be different. There is a specific type of page for:

  – Digital control orders (e.g., TCD)
  – Double indications (e.g., TSD)
  – Single indications (e.g., TSS)
  – Analog measurements (e.g., TM)
  – Counter (e.g., CNT)

  The parameters to be configured for each variable are (for example):

  – Variable name
  – Type of access (operator session, administrator session, etc.);
  – Assignment class;
  – Logical, remote and internal addresses;
  – Measurement, event and alarm management;
  – Type of recording for measurements (periodic, upon exceeding high or low threshold, upon percentage of variation or indication of minimum and maximum values per period);

  NOTE: The parameters to be configured depend on the type of page displayed.

  Classes Configuration page: The variables created can be grouped together by classes, to facilitate the management and display of variables. Each variable can be assigned to one of these classes by configuration. This page can be used to create, modify, or delete the classes managed by the embedded server, and determine those that will be visible in the Monitoring page.

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T200 P Unit Settings

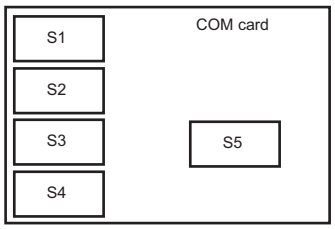
For a better understanding of the configuration of the T200 P unit, the following functions are discussed in this chapter:

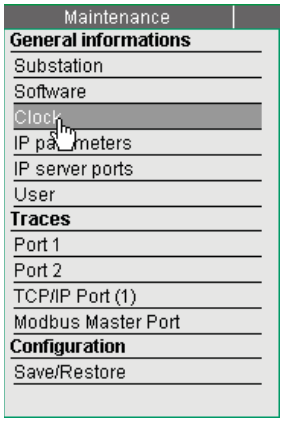
- Configuration of synchronization by GPS
- Configuration of SNTP service
- Configuration of Ethernet interfaces
- Backup/Restore of configuration parameters
- Configuration of communication with the Supervisor
- Configuration of switch controls
- Configuration of the various options
- Automatic control configuration
- Configuration of the data module
- T200 P unit variable configuration
- Class configuration

Configuration of Synchronization by GPS

Access the "Maintenance/Clock" page (Figure 20).

Figure 20: COM Card and Maintenance/Clock Page





In standard configuration, the T200 P unit's time can be set manually by the user or by synchronization from a PC connected to the T200 P unit. Optionally, the T200 P unit can be synchronized via a GPS module. This module allows the equipment to time stamp events precisely, without internal clock time drift.

The standard kit includes a GPS card, factory installed on the COM card of the T200 P unit (slot S5), and a GPS antenna with a cable 16 ft (5 m) long. Optionally, an antenna extension cable 32.8 ft (10 m) long is available.

Operating principle

The T200 P unit is synchronized every second automatically from the GPS network, provided that the satellite signal reception levels are adequate.

The T200 P unit can receive information from up to 14 satellites at a time. The larger the number of satellites, the more precise will be the measurements based on the GPS signals.

Upon initialization of the COM card, the minimum time for satisfactory reception of the GPS satellite signals ranges from 5–15 minutes, depending on the quality of the signals received. The average precision of time setting is approximately 1 ms (discrimination between two events: 10 ms).

Events specific to the GPS function are generated by the COM card (in the "System" log), providing information about the operating status of the GPS module:

- GPS started
- GPS synchronization OK
- GPS synchronization lost

NOTE: When the GPS option is present, it takes priority over SNTP time synchronization or manual time synchronization.

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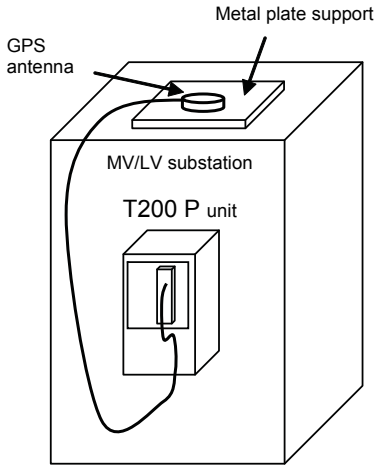
Figure 21: GPS Antenna Installation



Antenna mounting

The GPS signal acquisition card is an option for the T200 P unit. This card is factory installed on slot "S5" of the COM card.

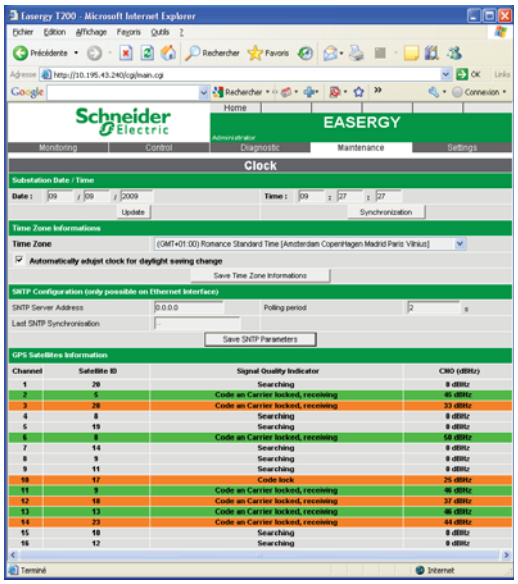
Synchronization by GPS option can be installed only on a "full" type COM card. For the GPS option to operate, install the GPS antenna outside the enclosure, on a *horizontal* metal mounting (the antenna is magnetized), in a location where GPS signals may not be disturbed by nearby obstacles that could act as a screen (wall, building, etc.). The field around the antenna must be free in order to receive satellite signals correctly. Figure 21 shows an example of antenna mounting on the roof of a substation where the T200 P unit is located.

The GPS antenna can withstand a temperature range of: –40 °F to +185 °F (–40 °C to +85 °C).

Example—Events generated by the GPS function in the “System” log:

21/09/2006 08:22:02.000	GPS synchronization OK
21/09/2006 08:21:58.007	Ehternet link On
21/09/2006 08:21:55.813	GPS started
21/09/2006 08:21:55.285	Default configuration restored
21/09/2006 08:21:55.285	Start

Figure 22: Clock Synchronization



Information relating to the GPS function

When the GPS card is installed on the COM card, the T200 P unit automatically tries to connect to the GPS network. Once the GPS signals are detected at a sufficient level, the "Clock synchronized by GPS" display appears in the Maintenance/Clock page of the embedded Web server of the T200 P unit and the configuration/monitoring parameters related to this option are displayed. See Figure 22.

When the GPS signals are detected at a sufficient level, the GPS card automatically takes control of time setting for the device and overrides time setting by SNTP (if the latter is present). Manual setting is no longer possible.

For correct operation, the GPS option requires configuration of the following parameters:

- Information concerning the time zone: the time provided by the GPS satellites is GMT universal time.

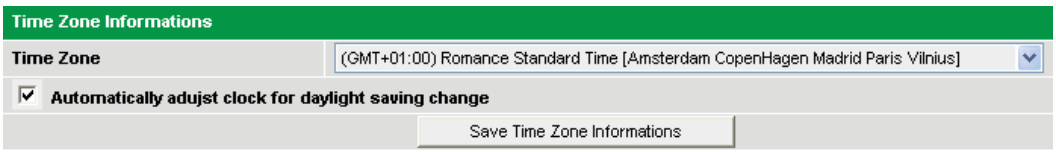
  The time zone must be configured to correspond with time in the country where the T200 P unit is located, so that the time on the T200 P unit matches the local time in the country (Figure 23).

  — Time zone: In the drop-down list choose the zone corresponding to the local time zone (the closest city having the same time zone).

  — Adjust the clock for automatic observation of summer time. Check the box "Adjust clock for automatic summer time adjustment" if the T200 P unit is to perform automatic time setting of the clock for changes related to the transition to summer time and winter time.

  — Save Time Zone information: click to accept configuration changes.

Figure 23: Time Zone Information Page



- The GPS position page provides information delivered by GPS satellites:
  - — Longitude and latitude
  - — Height above sea level
  - — Precision of horizontal measurement (longitude and latitude)
  - — Precision of vertical measurement (altitude)

  NOTE: The GPS position data appear in the page only when time synchronization is performed with the satellites (Figure 24).

Figure 24: GPS Position Page

GPS position					
Longitude	4° 59' 25"		Lattitude	45° 49' 32"	
Height above sea level	191	m			
Horizontal accuracy	3.525	m	Vertical accuracy	5.499	m

- GPS satellite data provides information concerning the quantity and quality of the GPS signals received from the satellites:
  - — Channels 1 to 14: The T200 P unit assigns a channel number for each satellite detected.
  - — Satellite identification: GPS identification No. of the satellite detected.
  - — Signal status: Provides knowledge of the connection status of the satellites. Six statuses can be displayed:

GPS connection status	Display color
Not connected	gray
Search in progress	gray
Signal detected, but unusable	red
Signal captured Signal and carrier wave captured Signal and carrier wave captured, reception	green if signal quality ≥ 45, otherwise orange

  - — The display color indicates the state of the GPS connection:

GPS connection status	Display color
No connection	gray
Connection in progress	gray
Signal detected, but unusable	red
Connection performed but not finalized or reception level is mediocre but sufficient for synchronization	orange
Connection performed with very good reception	green
Reception level weak, no connection possible	red

  - — Signal quality: Value displayed in dBHz allowing assessment of the quality of the signal level received for each satellite. For example, a level ≥ 45 dBHz is a very good reception level (Figure 25).

Figure 25: GPS Satellite Information Page

GPS Satellite Information			
Channel	Satellite ID	Signal Quality Indicator	CNO (dBHz)
1	28	Code and Carrier locked, receiving	33 dBHz
2	5	Code and Carrier locked, receiving	42 dBHz
3	8	Searching	0 dBHz
4	15	Searching	0 dBHz
5	17	Searching	0 dBHz
6	8	Code and Carrier locked, receiving	48 dBHz
7	0	Idle	0 dBHz
8	0	Idle	0 dBHz

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GPS synchronization

At least two satellites in reception are required (with reception level ≥ 45 dB) for time synchronization and position locating (longitude and latitude) to be operational on the T200 P unit. The larger the number of satellites, the more precise the measurements based on the GPS signals.

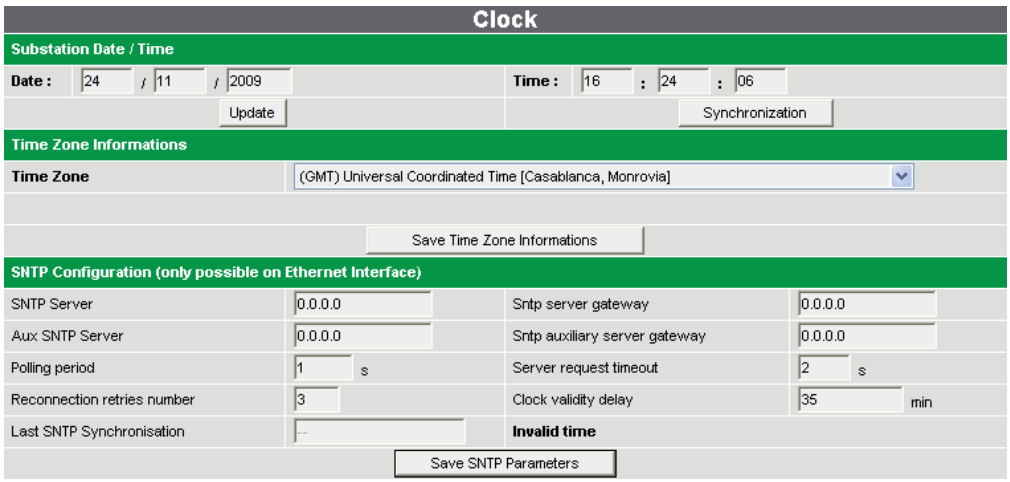
Configuration of SNTP Service

Access: "Maintenance/Clock" page (Figure 26).

The T200 P unit incorporates an SNTP client which allows the time on the internal clock of the T200 P unit to be set automatically from a network synchronization server, when a T200 P unit is connected to this network.

NOTE: When the SNTP option is configured, it overrides manual synchronization of the T200 P unit time and date (the PC time and date cannot be set manually).

Figure 26: Clock Page



Operating Principle

The T200 P unit can define two different SNTP servers—one main server and one auxiliary server—each being on different networks.

When the "Polling period" time delay configuration expires, the T200 P unit sends a request to the main SNTP server. If the T200 P unit receives a synchronization from the main SNTP server, the time on the latter is set and the synchronization cycle is completed.

If the T200 P unit obtains no response from the main SNTP server after the "Max. server response time" has elapsed, the T200 P unit attempts a new connection. If the "Number of reconnection attempts" is reached, the T200 P unit tries to become synchronized with the auxiliary SNTP server.

The cycle ends once the T200 P unit has synchronized with the second server or when it reaches the "Number of reconnection attempts" limit.

Configuration parameters

- SNTP server and auxiliary SNTP server: IP address of the main and auxiliary SNTP servers.

  NOTE: When the address is set to "0.0.0.0", the synchronization by SNTP function is deactivated on the server.

- Synchronization period: Allows the time synchronization period to be defined via the SNTP server. Configurable from 1 to 300 seconds.
- Number of reconnection attempts: Upon malfunction of synchronization with the server, the maximum number of attempts to be made.

- Last SNTP synchronization: Indication of the time and date of the last SNTP synchronization performed (cannot be modified).
- SNTP server gateway and auxiliary SNTP gateway: Address of the gateway for access to the main and auxiliary SNTP servers.
- Max. server response time: Maximum waiting time for the reply from the SNTP server before making a further attempt at synchronization.
- Period of validity of the clock: Time after which the T200 P unit must be resynchronized with the SNTP server.

Configuration of Ethernet Interfaces

Access: "Maintenance/IP Parameters" page (Figure 28). This page can be used to configure the Ethernet connection parameters of the T200 P unit.

The T200 P unit can include three IP addresses, specific to the device, to allow simultaneous connection from several TCP/IP network access points, including specific address (e.g., several Supervisors who want to access the T200 P unit from different TCP/IP networks, see Figure 27).

The three IP addresses use the same network physical interface (single Ethernet port on the COM card). For this reason, the two additional IP addresses added to that included as standard in the "Ethernet Interface" part, are called virtual Ethernet interfaces 1 and 2.

NOTE: The GPRS port is not is not affected by these virtual addresses.

Figure 27: Ethernet Interfaces

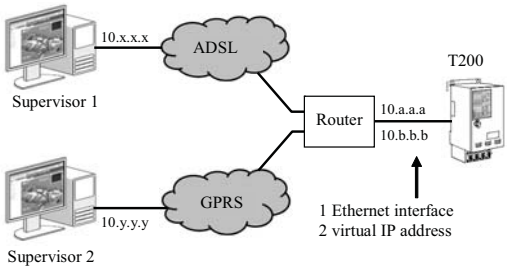
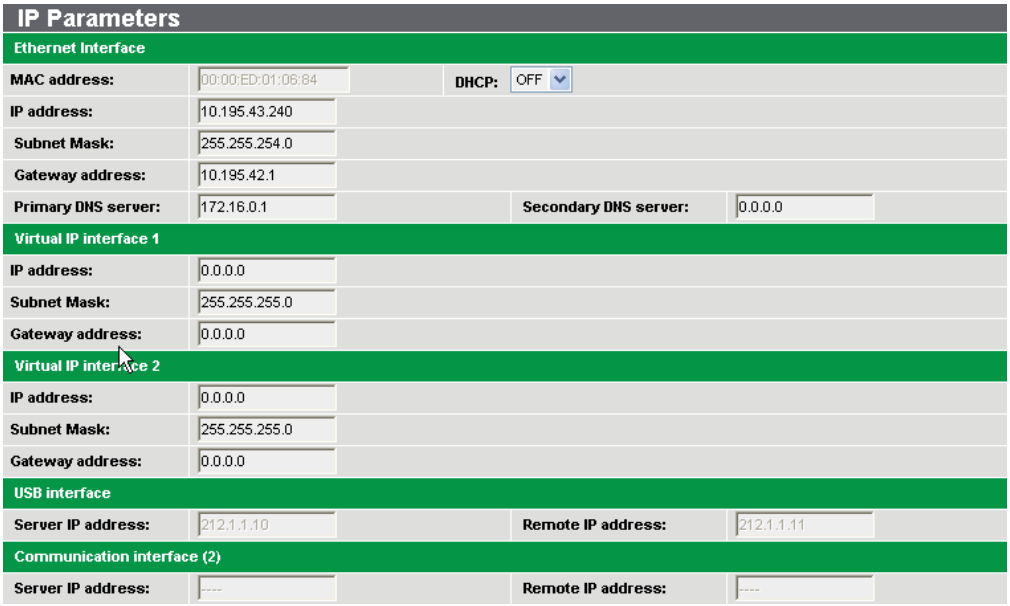


Figure 28: IP Parameters Page



Interface Ethernet

- MAC address: Unique identification address for each T200 P unit; factory preset (cannot be modified).
- DHCP: Defines whether the router of the Ethernet local area network can allocate a new IP address to the T200 P unit automatically upon a new connection.

  NOTE: Do not activate this function if the modified address is unknown; the result will be that you are unable to log on to the T200 P unit.
- IP address: Base IP address of the T200 P unit (as standard: 172.16.0.5).

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- Sub-network mask: The mask defines the possibility of configuration of the IP address on the Ethernet network. For each IP address field, (0) means authorization of 255 values, and (255) means fixed value for this field (as standard: 255.255.255.0).
- Gateway addresses: IP address of the server's Ethernet gateway. The gateway centralizes all network IP accesses (as standard: 172.16.0.1).
- Primary DNS server: IP address of the primary DNS server (Domain Name Server). The DNS enables the IP addresses to be associated with the website names (as standard: 172.16.0.1).
- Secondary DNS server: IP address of the secondary DNS server. Backup DNS server (as standard: 0.0.0.0).

Ethernet virtual interface 1 and 2

- IP address: IP address for the virtual interface. If set to "0.0.0.0", the virtual interface is deactivated.
- Sub-network mask: Sub-network mask of the virtual interface (same functioning as the Ethernet interface).
- Gateway addresses: IP address of the Ethernet gateway of the virtual interface (same functioning as the Ethernet interface).

USB interface

- Server IP address: IP address of the T200 P unit's embedded Web server for USB access; cannot be modified (as standard: 212.1.1.10).
- Client IP address: IP address assigned to the PC connected via USB to the embedded Web server; cannot be modified (as standard: 212.1.1.11).

Save/Restore Configuration Parameters

Access: "Maintenance Save/Restore" page (Figure 29).

The T200 P unit can save in file form all of the configurable parameters of the equipment (except the parameters of the "IP parameters" page which remain specific to each equipment item).

This file can be used for downloading to other equipment of the same type, enabling the T200 P unit to be configured automatically, instead of manually. However, the parameters specific to each T200 P unit must be personalized (e.g., protocol address, data thresholds, etc.).

The "Maintenance/Backup/Restore" page provides access to backup/restore resources (Figure 30).

Figure 29: Save/Restore Page

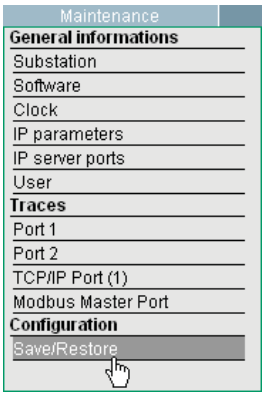
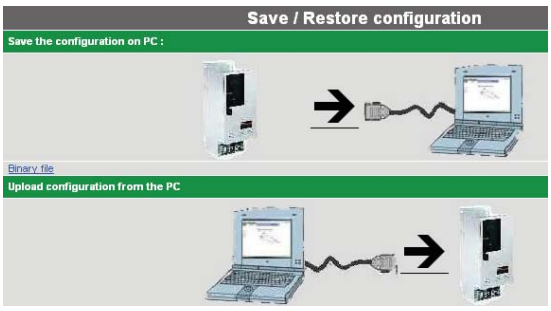


Figure 30: Save/Restore Page



Saving the configuration on PC

There are two ways to save the configuration of the T200 P unit as a backup file format on the PC:

- Zipped text file: Click once on the arrow (T200 P unit→PC) and the T200 P unit automatically creates a compressed text file (*.zip extension) containing the T200 P unit parameters.
- Binary file: Click once on the "Binary file" link and the T200 P unit automatically creates a binary file (file without extension) containing the T200 P unit parameters.

NOTE: There is no need to use the binary file format for backup unless you want to generate a backup compatible with an old software version of the T200 P unit (see Backup file compatibility on page 35).

Downloading the configuration from the PC

This section describes downloading to the T200 P unit the parameters contained in a backup file (PC→T200 P unit direction). In this mode there is only a single button for downloading.

The T200 P unit automatically detects the file type downloaded and manages the reading of information accordingly.

It is possible to download three types of files:

- Text file (*.txt extension)
- Binary file (without extension)
- Compressed text file (*.zip extension).

Backup file compatibility

In T200 P unit software versions below V2.50 or V3.50, backup and restore is possible only in a single type of file format (binary file).

To load old backup files on a current T200 P unit, it is essential that the T200 P unit include a V2.5x or V3.5x version. A V4.0x version will be incompatible and not allow this type of file to be loaded.

The V4.0x software versions (versions which include all of the recent T200 P unit functionality options) allow loading only of configuration files that have been created using a V2.5x, V3.5x, or V4.xx version.

To load a configuration file coming from an old software version on a T200 P unit containing a recent software version of the V4.xx type, do the following:

1. Load the old configuration file on equipment incorporating an equivalent software version (e.g., V2.5x for V2.xx versions and V3.5x for V3.xx versions).
2. Save the configuration in file form (without extension or *.zip).
3. Load software version V4.xx on this equipment.
4. Load the configuration file saved previously.
5. Save the configuration.
6. The file obtained will then be compatible with recent software (V4.xx, V2.5x, or V3.5x).

   NOTE: The file obtained will no longer be compatible with the old software (versions below V2.50 or V3.50). If the software version has not been updated on all of the T200 P units, it is prudent to keep both types of backup (old and new).

Parameters for Communication with the Supervisor

The COM card automatically detects the type of modem installed on the communication ports used for transmission to the SCADA system (ports 1 and 2). The configuration software automatically provides a choice of media on these ports that corresponds to the type of modem installed.

Since each type of medium has specific configuration parameters, the parameters present in the configuration pages for ports 1 and 2 take into account the type of medium that has been selected.

The configuration page for protocol parameters may take also into account certain parameters related to the type of medium selected.

NOTE: The protocol parameters related to the type of medium are described in this section. For information concerning parameters related to the protocol that are not addressed in this section, refer to the protocol user's manual.

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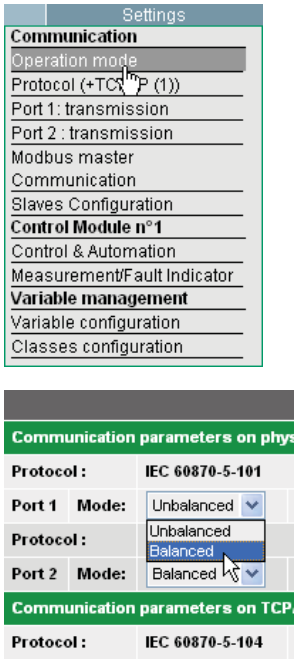
Operating Mode Page

Figure 31: Operating Mode Page



Access: "Settings/Operating Mode" menu (Figure 31).

This page allows you to activate the transmission ports, select the type of modem to be used, and determine how the modem will be managed (up to two communication ports are available). The parameters for this page can be viewed and/or modified depending on the user profile.

Configuration for each port used (Port 1 or Port 2)

- Mode: Allows choice of, or indicates, the transmission mode used for dialog with the SCADA system.

  Depending on the protocol used, there may be a choice between Master/Slave or Master/Master mode. Some protocols are fixed, from the transmission mode viewpoint, and do not allow this choice. In those cases, the T200 P unit provides an indication, without modification.

  Master/Slave: communicates exclusively in the Scada→T200 P unit direction. No remote alarm function used in this mode.

  Depending on the protocol, the exact title displayed may be:

  — Unbalanced (e.g., IEC protocol);
  — Master/Slave;
  — No report by exception (e.g., Modbus protocol);
  — No unsolicited response (DNP3 protocol).

  Master/Master: communicates in both directions, SCADA→T200 P unit and T200 P unit→SCADA.

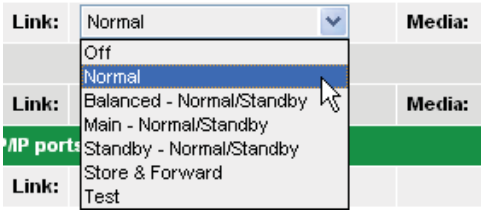
  The remote alarm function is used in this mode if one of the modes mentioned below, corresponding to the Master/Master mode, is configured. However, the remote alarm function will not be used if the Master/Slave mode is configured.

  Depending on the protocol, the exact title displayed may be:

  — Balanced (e.g., IEC protocol);
  — Master/Master;
  — Report by exception (e.g., Modbus protocol);
  — Unsolicited response (e.g., DNP3 protocol).

  NOTE: The "Report by exception" mode is not really a Master/Master mode. It is a Master/Slave mode with the possibility of alarm sending to the SCADA system by means of the "Report by exception" function, which from the functional viewpoint resembles a Master/Master mode.

Figure 32: Link Page



- Link: Allows definition of the way in which the ports will be managed according to one of the following modes (refer to Figure 32):

  — Off: No transmission over this channel.
  — Normal: Main transmission channel to the SCADA system. Two "Normal" channels with the same protocol but with different characteristics (e.g., type of transmission) can be used if there are two remote control systems (main and maintenance). The T200 P unit cannot manage simultaneous remote controls coming from the two systems.
  — Balanced – Normal/Standby: Two channels are necessary in this mode. The operation of the channels is symmetric. In the event of a fault on the channel in service, switchover to the other channel takes place automatically.

— Main – Normal/ Standby: Requires another channel as " Standby – Normal/Standby." Same operation as "Balanced" but with priority use of the main channel.

— Standby – Normal/ Standby: Requires another channel as "Main – Normal/Standby." Same operation as "Balanced" but with use of the backup channel if malfunction of the Main channel. A configurable option can be used to define a priority return to the main channel if the latter becomes available again.

— Store & Forward: Function used only in radio mode. In addition to the normal channel function of transmission to the SCADA system, this channel is also used for relaying to an auxiliary T200 P unit, located within reach of transmission, which is not accessible by other means.

— Test (in radio mode only): Allows a fixed frequency to be generated on the radio network to allow antenna installation adjustment operations or level measurements on fields received on another T200 P unit within reach of the first.

For further information, see “Configuration of Normal/Standby Mode” on page 38 and “Configuration of Store & Forward Mode” on page 39.

NOTE: The operating modes of the ports mentioned above may or may not be available, depending on the protocol.

- Medium: Allows definition of the type of transmission medium, to be used for the link to the SCADA system, for each port. Configure the port according to the type of transmission medium wanted. The following choices depend on the type of modem detected on the COM card port:

  RS232 modem, not isolated, installed on the port:

  — Direct RS232 (internal interface)
  — Radio (external with modem)
  — PSTN (external modem, Hayes command)
  — GSM (external modem, Hayes command)
  — PSTN (UMPC and external modem)

  RS232/RS485 modem, isolated 2.5 kV, installed on the port:

  — Direct RS232 (internal interface)
  — Radio (external with modem)
  — PSTN (external modem, Hayes command)
  — GSM (external modem, Hayes command)
  — PSTN (UMPC and external modem)
  — Direct RS485 (internal interface)

  Radio modem installed on the port:

  — 1200/2400 baud FFSK radio (internal modem)
  — 600/1200 baud FSK radio (internal modem)
  — 600/1200 baud LL radio (internal modem)

  GSM/GPRS modem installed on the port:

  — GSM (internal modem)
  — GPRS (internal modem)

  PSTN modem installed on the port:

  — PSTN (internal modem)

  NOTE: A medium not configured or configured incorrectly generates a fault on the COM card (red fault indicator lamp lit on the front of the card).

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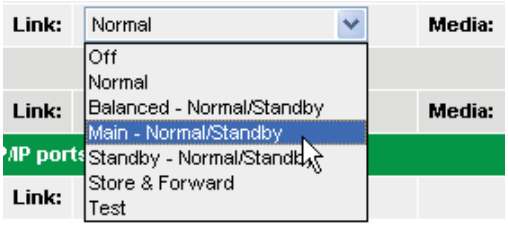
Configuration of Normal/Standby Mode

Figure 33: Normal/Standby Page



The Normal/Standby mode allows the two communication ports to the Supervisor to be used in communication redundancy management.

When the "Normal/Standby" mode is configured as link type on ports 1 and 2, the "Quality of transmission parameters" section becomes accessible in the "Operating modes" page and the corresponding parameters can be configured. See Figure 33.

This mode requires the use of two communication channels (ports 1 and 2) to operate. Two operating modes are possible:

- Balanced mode: No criterion of priority of one channel over the other in this mode. As long as communication functions on the channel in service, it stays on that channel. Upon detecting loss of communication on the channel in service, it is switched over to the other channel. Both channels must be declared as "Balanced."
- Main/Backup mode: Priority is given to one of the two communication channels (channel declared as "main"). As long as communication functions on this channel, it stays on this channel as priority. The channel declared as "Backup" is used only in the event of an operating malfunction on the main channel. Return to the main channel can be enabled or inhibited by configuration ("Authorize return to main channel" parameter). A time delay must be set to define when to perform a return to the main channel ("time delay before return" parameter).

Reception quality criteria

The T200 P unit uses the transmission quality criteria to define the conditions of channel changeover. Two communication criteria qualities for the T200 P unit are configurable.

They concern the quality of transmission ("TxQuality") and the quality of reception ("RxQuality"). The value entered is indicated as a % of sent and received frames which are correct.

Two separate cases must be considered:

- Master/Master mode (mode with alarms):

  When the T200 P unit has to take the initiative of sending frames to transmit an alarm, it may change the transmission channel if the quality of the transmission connection is not satisfactory. In that case, the T200 P unit evaluates the quality of transmission according to the quality of the response obtained, following a request upon alarm sent to the Supervisor.

  A configurable parameter ("NbSrcv") defines the number of repeats to be performed in the event of poor quality of response by the Supervisor after sending an alarm. The T200 P unit uses this criterion to consider that the connection is poor and that it is necessary to change over to the other channel.

- Master/Slave mode (mode without alarm):

  In this mode, the T200 P unit is Slave. It cannot take the initiative of changing transmission channel. It must therefore inform the Supervisor that the connection is poor and that it is necessary to change over to the backup channel.

  To do so, the T200 P unit will stop communicating if it considers that the connection is not good on the channel in service. The supervisor must be capable of detecting the communication turn off and take the initiative of changing over to the other channel.

  In this mode, the T200 P unit cannot estimate the quality of the connection in transmission. Only the reception criteria can be taken into account.

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Diagnostic

For each port, the T200 P unit gives information concerning the number of valid frames sent and received and a quality percentage relative to the number of frames handled.

Figure 34: Diagnostic Page

Quality of parameters transmission							
Port 1	RxQuality	40 %	TxQuality	40 %	NbSrcv	3	
Port 2	RxQuality	40 %	TxQuality	40 %	NbSrcv	3	
Allow return to main channel		Yes	Delay before return	60 s			
Diagnostic							
Port 1	Reception	Number of frames treated : 0		Number of valid frames : 0		Quality : -	
	Emission	Number of frames treated : 0		Number of valid frames : 0		Quality : -	
Port 2	Reception	Number of frames treated : 0		Number of valid frames : 0		Quality : -	
	Emission	Number of frames treated : 0		Number of valid frames : 0		Quality : -	

Configuration of Store & Forward Mode

Figure 35: Store & Forward Page

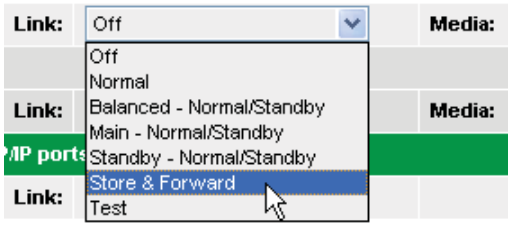
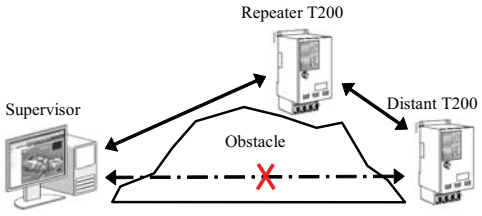


Figure 36: Types of T200 P Units Managed in Store & Forward Mode



Store & Forward (or repeater) mode is used only in radio communication. This function allows a T200 P unit to serve as a radio relay for another distant T200 P unit that cannot be accessed directly by the Supervisor due to access problems. The Distant T200 P unit must be within transmission range of the first T200 P unit, acting as relay (Repeater T200 P unit).

Upon detecting a message which is not addressed to it, the Repeater T200 P unit resends it over the same channel so as to reroute it toward the T200 P unit for which the message is destined.

Three types of T200 P unit can be managed in the "Store & Forward" mode (refer to Figure 36):

- Standard T200 P unit: A conventional T200 P unit. It can communicate directly with the control center without going the through Repeater T200 P unit. This T200 P unit must be configured with a "Normal" link.
- Repeater T200 P unit: This will act as relay for other T200 P units which cannot communicate directly with the Supervisor. This T200 P unit must be configured with "Store & Forward" link type.
- Distant T200 P unit: A distant T200 P unit which cannot communicate directly with the Supervisor and which will use the Repeater T200 P unit as communication gateway to be able to communicate with the Supervisor. This T200 P unit must be configured with "Normal" link type.

Specifications

The Repeater T200 P unit uses the same port (and hence the same radio) to communicate with the Supervisor and with the Distant T200 P units.

The Repeater T200 P unit can manage a maximum of ten Distant T200 P units. These Distant T200 P units must be declared by configuration in the Repeater T200 P unit. When the "Store & Forward" mode is configured on the Repeater T200 P unit, an additional "Store & Forward Parameters" section is displayed in the "Operating mode" page. This part can be used to configure for each distant T200 P unit:

- Scada end link address: This is the address that must be defined at the Supervisor end to access the Distant T200 P unit. This address must be configured identically in the Repeater T200 P unit. This address is used only for the Supervisor-Repeater T200 P unit connection.

- Distant T200 P unit end link address: This is the address that must be configured on the Distant T200 P unit and also identically in the Repeater T200 P unit. This address is used only for the Repeater T200 P unit-Distant T200 P unit connection.

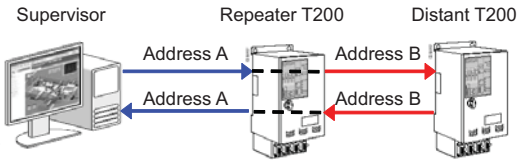
The Repeater T200 P unit has its specific link address so that the latter may be used as a typical standard T200 P unit in addition to the Repeater function.

Figure 37: Store & Forward Parameters

Store & Forward parameters

	T200 Standard address	1	
	Station number	**Link Address Scada Side**	**Link Address T200 F side**
Port 1	1	23	1
	2	24	2
	3	25	3
	4	26	4
	5	-1	-1
	6	-1	-1
	7	-1	-1
	8	-1	-1
	9	-1	-1
	10	-1	-1

Figure 38: Substitution Principle of Addresses Link



Blue:
Message including address used by the Supervisor for accessing Distant T200 P (e.g., Address A)
Red:
Message including address used by the Repeater for accessing Distant T200 P (e.g., Address B)

Operation

When the Supervisor wants to communicate with one of the Distant T200 P units, the latter sends a protocol frame containing the link address of the Distant T200 P unit to be accessed.

The Repeater T200 P unit receives this frame and sees that it corresponds to the address of one of the Distant T200 P units defined in its list of 10 Distant terminals.

The Repeater T200 P unit sends back a frame to the corresponding Distant T200 P unit, replacing the link address with that which has been defined for it in its list for this Distant T200 P unit.

The Distant T200 P unit receives the frame and replies to the request with a frame containing the link address that is specific to it.

The Repeater T200 P unit receives the reply and sends a frame back to the Supervisor according to the same principle of replacement of the link address between that used by the Distant T200 P unit and that used by the Supervisor.

NOTE: When a Master/Master type link is used, the Distant T200 P unit can initiate communication to send an alarm. The transmission principle remains the same.

Constraints of the Store & Forward function

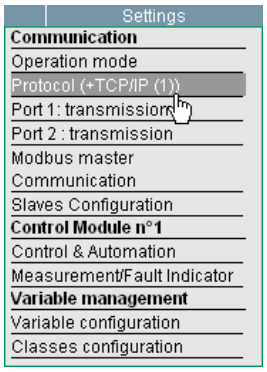
1. Rerouting frames, from one end or the other of the Repeater, results in longer transmission times than for direct access on a typical T200 P unit. For this reason, the reply waiting times will have to be increased on the Distant T200 P units.
2. The Repeater function of the T200 P unit uses only a single transmission port. Radio traffic over this channel can be substantial due to the numerous messages being re-transmitted at the Distant T200 P unit end and the Supervisor end. Message collisions and repetitions must be expected on the radio traffic.

3. The handling of messages received by the Repeater T200 P unit is treated as a whole. The Repeater T200 P unit will end retransmission of the message to be handled to the Supervisor and the Distant T200 P unit before receiving and handling other messages. This constraint may result in repetition phenomena on devices other than the Repeater T200 P unit.
4. If a Repeater T200 P unit can no longer transmit, all of the Distant T200 P units will be affected by this non-communication.
5. The quality of the radio link depends on the efficiency of the collision avoidance function. This function gives good results if the information giving the busy state of the wireless network is reliable. Since Distant T200 P units can pick up frames sent by other T200 P units, the occupancy state of the wireless network may not be efficient as usual. The functioning of the Repeater system may be degraded for this reason.

Protocol Page

Access: "Settings/Protocol (+TCP/IP (1))" page (see Figure 39).

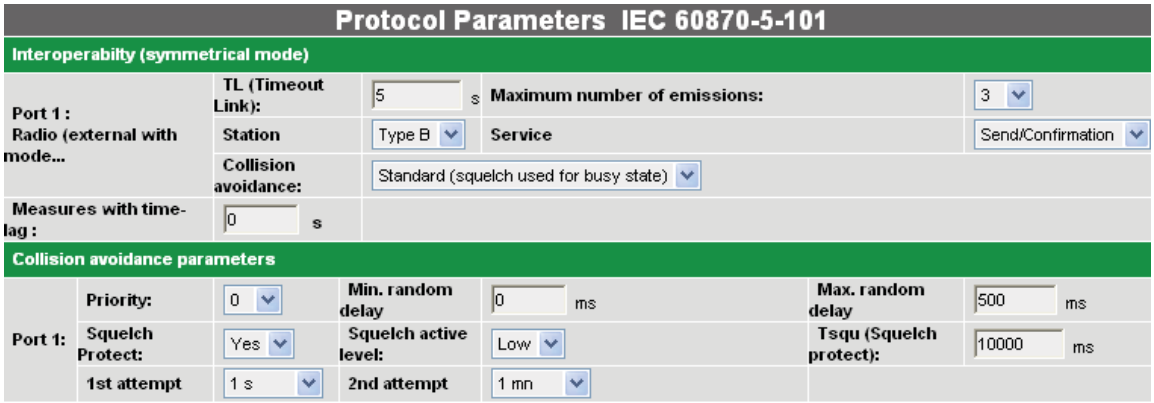
Figure 39: Protocol Page



The parameters of this page depend entirely on the type of protocol used. Detailed explanations concerning this page are not addressed in this manual. Refer to the specific protocol user's manual for details concerning configuration of the parameters of this page.

NOTE: Certain parameters of this page depend on the type of modems installed on the ports. For example, the "Collision Avoidance Parameters" section (see Figure 40) is displayed in this page only when a Radio or PSTN modem (internal or external) is configured on the COM card.

Figure 40: Protocol Parameters



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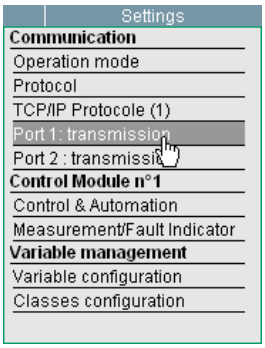
Port 1 (or 2): Transmission Page

Figure 41: Settings / Port X Transmission Page



Access: "Settings/Port X: Transmission" page (see Figure 41).

The parameters display for this page depends on the type of modem installed on the port of the COM card (port 1 or port 2) and on the transmission medium chosen in the "Settings/Operating Mode" page.

Configuration procedure

The T200 P unit is factory preset with a default configuration corresponding to the type of modem installed on the COM card (internal modem) or on the sliding plate of the enclosure (external modem).

The parameters of this page can be adjusted depending on what is required for the modems used or the transmission network (for example, modem management signals and associated time delays).

After checking that dialog is established between the T200 P unit and the Supervisor, adjust the transmission delays by first configuring the high values for all of the delays.

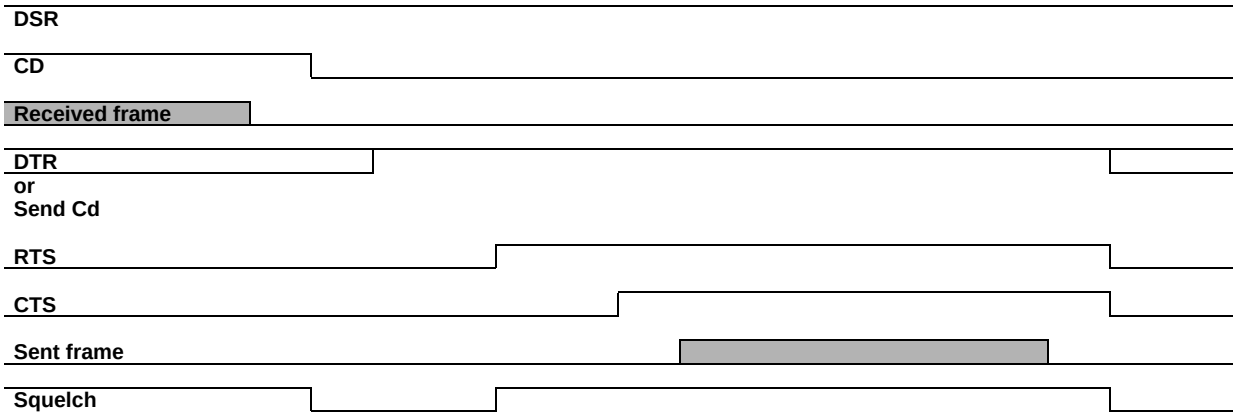
Gradually reduce the first time delay in order to determine the operating limit of the modem relative to the adjusted signal. This delay will be increased by several tens of milliseconds to retain a response margin. The procedure will start again with the other delays. This method optimizes the T200 unit/Supervisor transmission times.

In case of doubt concerning the configuration, it is preferable to leave the default values.

Modem management signals

Figure 42 shows the management signals involved during communication between the T200 P modem and the interface or the external radio, or even directly with the control center.

Figure 42: Timing Diagram of Management Signals



- **DSR (Data Send Ready):** This signal can be supplied to the T200 P unit to indicate that the Control center (or the modem) is capable of transmitting (or simply that it is energized). This signal is used only in the case of an RS232 link (not used in radio mode).
- **CD (Carrier Detect):** This signal, when it exists, is used to confirm receipt of the received frame. It can also be used to learn the transmission network occupancy.

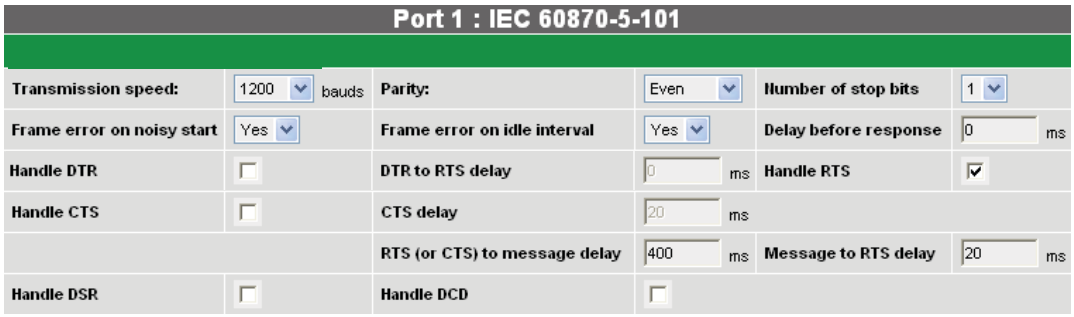
- **DTR (Data Terminal Ready):** If the Control center uses DSR, DTR is used to indicate that the T200 P unit is ready for transmission (equivalent of DSR but in the other direction).
  - **In radio mode with internal modem:** The signal used by the T200 P unit to activate radio terminal transition to sending when it requires different commands for transition to sending and carrier sending.
  - **In radio mode with external modem:** This signal is generally not used because RTS is used as the sole command to cause rising of the send command and cause rising of the carrier.
- **RTS (Request To Send):** Activates sending of the modem carrier.
- **CTS (Clear To Send):** After the T200 P unit has performed the Request To Send, the sender sometimes takes a certain time to rise in power before being able to send the messages submitted to it. This is especially true for radio equipment. Accordingly, when the equipment is ready to send, it indicates this to the T200 P unit by causing the CTS signal to rise.
- **Squelch:** Used only in radio mode to indicate to the T200 P unit the occupancy state of the radio network.

Definition of modem management signals and time delays

The T200 P unit allows the user to configure, if necessary, use or not of the modem management signals and the various associated time delays.

Figure 43 shows the list of configurable options concerning these modem management signals. Configuration is performed in the pages for ports 1 and 2 of the T200 P unit Web server:

Figure 43: Port 1 Configuration Page



- **Delay before response:** After receiving a message, this is the waiting time before sending the message (response). This delay serves to avoid any overlapping of signals between the message received and the message sent. This delay is often used with a radio medium or with certain modems which require a time lag to turn around, i.e., a minimum time to go from receive mode to send mode.
- **Handle DTR management:** If this option is selected, the DTR signal will be managed during transmission exchanges with the modem.
- **DTR–RTS delay:** (if RTS is used): The time delay between the Data Transmission Ready signal (DTR) and the Request to Send (RTS) signal.
- **Handle RTS management:** If this option is selected, the RTS signal will be managed during transmission exchanges with the modem.
- **Handle CTS management:** If this option is selected, the CTS signal will be managed during transmission exchanges with the modem.

- **RTS–CTS delay:** (if CTS used): This is the maximum time during which the T200 P unit waits for the CTS after the RTS has been activated. If, after this delay, CTS has not become active, the T200 P unit discontinues sending the frame.
- **RTS (or CTS) delay–Message:** (if RTS or CTS is used): This is the time between transition to the active state of RTS (or CTS if this signal is used) and the start of message sending. Typically, this time lag is used to wait for a stable carrier period established by the modem.

  If necessary, when CTS is not available, the time for installation of the carrier to solve the problem posed by the non-availability of this signal can add to this delay. Likewise, if the DTR and RTS commands are common, the time for rise in power of the sender can be added.

  NOTE: Example of delay to be configured on the T200 P unit, depending on the type of radio:

  — Motorola CM 340 or GM340 radio: RTS–Message delay = 150 ms
  — TAIT 811x radio: RTS–Message delay = 100 ms
  — MDS4710 radio: RTS–Message delay = 50 ms
- **Message–RTS delay:** (if RTS is used): This is the minimum time to wait, after sending a message, before causing RTS and DTR (or Send command) to fall again. This delay prevents the end of the message from being truncated by the premature fall of modem sending.

  NOTE: Example of delay to be configured on the T200 P unit, depending on the type of radio:

  — Motorola CM 340 or GM340 radio: Message–RTS delay = 100 ms
  — TAIT 811x radio: Message–RTS delay = 80 ms
  — MDS4710 radio: Message–RTS delay = 50 ms
- **DSR management:** If this option is selected, the DSR signal will be managed during transmission exchanges with the modem.
- **CD management:** If this option is selected, the CD signal will be managed during transmission exchanges with the modem.

General parameters (common to the various transmission media)

Certain configurable parameters of the ports 1 and 2 pages are common to numerous types of modems. This section will describe the meaning of these parameters and how to configure them.

- **Baud rate:** This is the speed of transmission between the T200 P unit and the modem. When an external modem is used, the configured speed is not necessarily the speed that will be used for the link to the Supervisor, because the external modem can use a different speed to that used for the RS232-T200 P unit link. The choice of available speeds differs depending on the type of modem installed on the ports. For example:

  — FFSK radio: 1200 or 2400 baud
  — External radio or internal RS232: 200 to 38400 baud
  — Internal GSM: 600 to 9600 baud
- **Parity:** This is the frame character parity for transmission to the Supervisor. Some modems do not manage parity. In such cases, the T200 P unit will have to be configured with the "No parity" option. The appropriate parity bit setting will be defined by the type of modem used.

The Control center must match the modem configuration for data transmission to occur.

NOTE: If a parity bit is not used, the security of the transmission could be compromised, such that a corrupt data transmission might be accepted as a correct data transmission. See the specific protocol user's manual for details concerning this function.

There are four possible configurations: no parity, space, even, or odd.

NOTE: Parity is not used in PSTN, GSM, GPRS, and FFSK radio links.

- **Number of stop bits:** This is the number of stop bits used to define the end of a frame during transmission. There are two possible configurations: one or two stop bits.
- **Frame error on idle line:** The T200 P unit is capable of detecting a gap greater than one bit between two characters of a frame.

  With certain protocols, any frame having this feature can be rejected. This allows secure transmission. Frame rejection will be activated if this option is set to "Yes." This configuration implies that the Supervisor and the modems involved in the transmission circuit ensure that there are no gaps. While this is sometimes true with regard to the Supervisor, it is not completely true for many modems (case of packet transmission). In this specific case, "No" should be set. However, transmission security must then be ensured by other means (refer to the documentation for the protocol used for more information).

  NOTE: This parameter is used only on a radio or LL link.

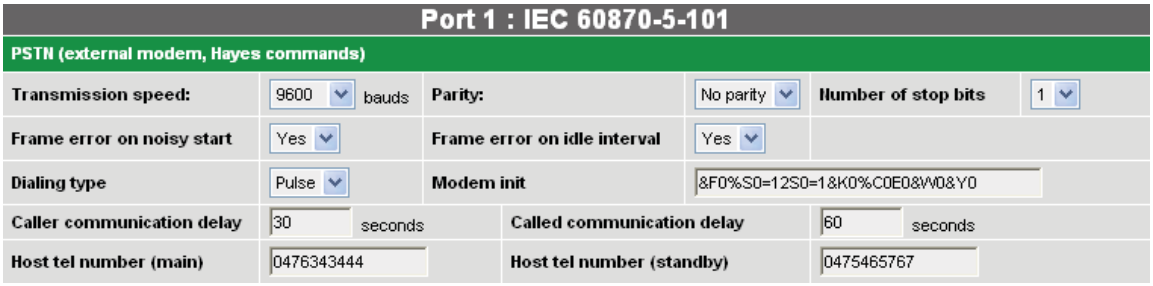
- **Frame error on noisy outgoing cable:** Some transmission networks could constantly generate noise at the start of a frame. In that case, this option should be set to "No" to avoid systematically rejecting all of the received frames which could be considered incorrect. However, the incorrect character generated by the noise located in the frame header will be eliminated when reading the frame, because this character will not correspond to what is expected by the protocol. Usually, the noise does not exist and the option should be set to "Yes."

  NOTE: This parameter is used only on a radio or LL link.

Parameters specific to each transmission medium

This section describes the configuration parameters specific to each modem (see Figure 44).

Figure 44: PSTN Configuration Parameters



- **PSTN and GSM medium** (internal or external modem):
  - **Dialing type:** Choice of the type of dialing to be used for the telephone call to the Supervisor during an alarm sequence. There are two choices: pulse (decimal) and multifrequency (MF).

    NOTE: Configuration available in PSTN but not in GSM.

— **Modem Init:** The Modem Init sequence is necessary to configure the modem for operation linked to the T200 P unit application. The default Init sequence corresponds to the AT commands necessary for an internal modem (modem installed on the COM card). For an external modem, the Modem Init sequence is not defined in the configuration supplied. It is user-defined according to the brand and model used (refer to the modem manual).

NOTE: Configuration is available in PSTN but not in GSM.

NOTE: The Modem Init sequence is sent to the modem only after initialization of the T200 P COM card (following a reset or power up of the T200 P unit). After changing the Init sequence, the COM card must be reinitialized for it to be taken into account by the modem.

Default Init sequence: &F0%S0=12S0=1&K0%C0E0&W0&Y0.
If in doubt, do not change this default Init sequence, because the T200 P unit–Supervisor link is likely to no longer operate correctly.

— **Caller communication delay:** Maximum delay for connection between the T200 P unit and the Supervisor, following a call by the T200 P unit, before release of the PSTN line by the T200 P unit.

— **Called communication delay:** Maximum delay for connection between the T200 P unit and the Supervisor, following a call by the Supervisor, before release of the PSTN line by the T200 P unit.

— **Telephone number (main):** Main phone number that the T200 P unit uses to call the Supervisor during an alarm sequence. The T200 P unit will try to call three times to this "normal" number before switching to the "Backup" number.

— The codes accepted for telephone numbers are:

0 to 9 (for the call number);
P (for Pulse = decimal dialing setting);
T (for Tone = MF dialing setting);
W (for Wait);
space bar (for space);
+ (equivalent to "00" for international dialing).

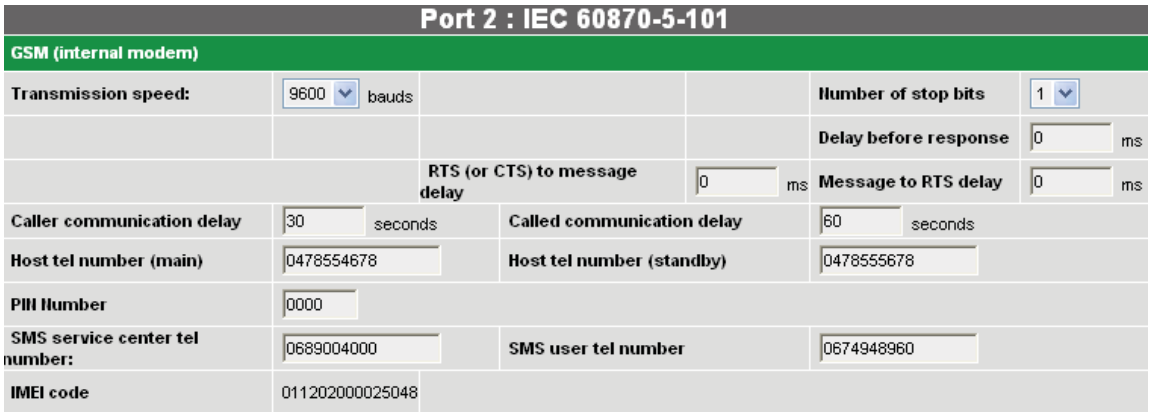
Example of config.: "P 00W0674948960" or "P +W0674948960"

NOTE: There should be a space between the "T" or "P" and the call number.

— **Host telephone number (Standby):** Secondary phone number that the T200 P unit uses to call the Supervisor during an alarm sequence. This phone number is used only if the main number does not reply after three unsuccessful attempts.

The T200 P unit will also try to call three times on this second number before it stops calling, unless another alarm occurs, which will restart the alarm calls to the “Normal” number. The same codes apply as shown for the Host Telephone number.

Figure 45: GSM Configuration Parameters



Port 2 : IEC 60870-5-101					
GSM (internal modem)					
Transmission speed:	9600 bauds			**Number of stop bits**	1
				Delay before response	0 ms
		RTS (or CTS) to message delay	0 ms	**Message to RTS delay**	0 ms
Caller communication delay	30 seconds	**Called communication delay**		60 seconds	
Host tel number (main)	0478554678	**Host tel number (standby)**		0478555678	
PIN Number	0000				
SMS service center tel number:	0689004000	**SMS user tel number**		0674948960	
IMEI code	011202000025048				

- **GSM medium** (internal or external modem):

  NOTE: After three validations of the page configuration or three modem initializations with an incorrect PIN code, the SIM card is blocked. The only solution is to call the operator to unblock it.

  The first time that the T200 P unit initializes the GSM modem, the latter asks the modem if it needs the PIN code.

  If the modem replies in the negative, the T200 P unit will not manage the PIN code and the latter will not need to be entered by the user.

  However, if the modem replies that it needs the PIN code, the T200 P unit will manage this parameter and the PIN code must be configured.

  Once the PIN code has been initialized, the T200 P unit asks the modem to deactivate use of the PIN code.

  The latter will therefore no longer be used by either the T200 P unit or the GSM modem.

  — SMS service center telephone number: This is the number of the service center of the GSM operator which centralizes and stores all of the SMS messages sent to reroute them to the end user. Contact the operator to obtain this number. It is also possible to find out this number from a GSM telephone using the same operator as that used by the SIM card of the T200 P unit, because the number can be looked up in the telephone's configuration parameters.

  Finally, it is also possible to find out this number in the port trace following connection of the modem to the GSM network. The number is displayed on the line including the "AT+CSCA" command (see Figure 46).

Figure 46: Port Trace During an Attempt to Connect to the GSM Network (Modem Init)

```
08:48:34.474  MODEM - Power up
08:48:35.986  MODEM - Command mode
08:48:36.994  MODEM - Tx : ATE0
08:48:39.518  MODEM - Tx : AT&S0
08:48:42.045  MODEM - Tx : AT
08:48:43.071  MODEM - Rx : OK
08:48:44.079  MODEM - Tx : AT+CPIN?
08:48:45.120  MODEM - Rx : +CPIN: SIM PIN
08:48:45.120  MODEM - Tx : AT+CPIN=****
08:48:47.230  MODEM - Rx : OK
08:48:47.230  MODEM - Tx : AT+CLCK="SC",0,****
08:48:49.770  MODEM - Tx : AT+CREG?
08:48:50.807  MODEM - Rx : +CREG: 0,1
08:48:50.807  MODEM - Tx : AT+CSCA=0689004000
08:48:54.818  MODEM - Tx : AT+CMCF=1
08:48:57.347  MODEM - Tx : AT+CSAS
08:48:59.875  MODEM - Tx : AT+CMEE=0
08:49:02.403  MODEM - Tx : AT&C1
08:49:04.929  MODEM - Tx : AT&D2
08:49:07.455  MODEM - Tx : AT+IPR=0
08:49:09.983  MODEM - Tx : ATS0=1
08:49:12.509  MODEM - Tx : AT+WIND=0
08:49:15.039  MODEM - Tx : AT+CICB=0
08:49:17.567  MODEM - Tx : AT+CBST=7,0,1
08:49:20.101  MODEM - Tx : AT&W
08:49:20.101  MODEM - Modem GSM initialized
```

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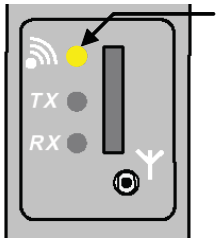
Figure 47: Exchange Frames During Connection with the Supervisor (in Modbus Protocol)

```
11:38:37.093  SlaveAddr = 03  <<<<<  Reading N output words
                                     Addr = 0x34
                                     03 03 00 34 00 03 45 E7
11:38:37.113  SlaveAddr = 03  >>>>>  Reading N output words
                                     03 03 06 A9 AA AA A9 55 00
                                     F6 9C
11:38:37.357  SlaveAddr = 04  <<<<<  Reading N output words
                                     Addr = 0x0
                                     04 03 00 00 00 01 84 5F
11:38:37.593  SlaveAddr = 04  <<<<<  Reading N output words
                                     Addr = 0xf
                                     04 03 00 0F 00 21 B5 84
```

Figure 48: Front Panel Indicators of the GSM Modem for the COM Card



Yellow status indicator of connection to the GSM network

Figure 49: Example of Modem Initialization

```
15:59:28.157    MODEM - Tx : AT+WIND=0
15:59:30.683    MODEM - Tx : AT+CICB=0
15:59:33.210    MODEM - Tx : AT+CBST=7,0,1
15:59:35.741    MODEM - Tx : AT&W
15:59:48.333    MODEM - Modem GSM initialised
16:00:18.546    MODEM - Asking for level reception
16:00:19.581    MODEM - Rx : 20
16:00:19.590    MODEM - Rx : OK
16:00:39.732    MODEM - Asking for level reception
16:00:40.766    MODEM - Rx : 20
16:00:40.774    MODEM - Rx : OK
16:01:00.916    MODEM - Asking for level reception
16:01:01.950    MODEM - Rx : 23
16:01:01.957    MODEM - Rx : OK
```

— SMS user telephone number: SMS number that the T200 P unit uses in the event of an alarm sequence to send the text message to the user who is on standby. Same comment as for the "Normal" telephone number concerning the codes to be used for the telephone number.

GSM modem connection status:

By flashing of the indicator lamp on the front of the GSM modem:

The indicator lamp is lit steadily:	The modem is not connected to the GSM network.
The indicator lamp flashes slowly (every 2.5 seconds):	The modem is connected to the network but there is no remote link.
The indicator lamp flashes rapidly (every second):	The modem is connected to the network and a remote link is established.

By consulting the AT commands for modem initialization in the port trace corresponding to the GSM modem:

To the "AT+CREG" command requested by the T200 P unit, the modem should reply "+CREG: 0.1" when the modem is connected to the network or "+CREG: 0.2" if it is not (see Figure 48).

Moreover, when the remote link is established between the T200 P unit and the Supervisor, the port trace also displays protocol frame exchanges between the T200 P unit and the Supervisor.

Level of GSM reception

The level of the GSM signal received by the T200 P unit's modem can verify that the T200 P unit is able to correctly receive frames from the Supervisor. This function also allows antenna installation, on the support, to be adjusted to optimize the reception.

To know the level of GSM signal received, consult the port trace corresponding to GSM modem. After the modem is initialized, the display screen of the T200 P unit will automatically show the level of GSM signal reception.

NOTE: When the T200 P unit detects a frame from the Supervisor, the display of protocol frames gets priority from the GSM level indication.

Possible values for GSM signal	Level
Reception GSM not detectable:	99
Reception GSM not sufficient:	0–10
Reception GSM correctly detected:	11–31

- **FSK or FFSK radio medium** (internal or external modem):
  - — **Caller communication delay:** Maximum delay for connection between the T200 P unit and the Supervisor following a call by the T200 P unit before release of the radio link by the T200 P unit.
  - — **Called communication delay:** Maximum delay for connection between the T200 P unit and the Supervisor following a call by the Supervisor before release of the radio link by the T200 P unit.

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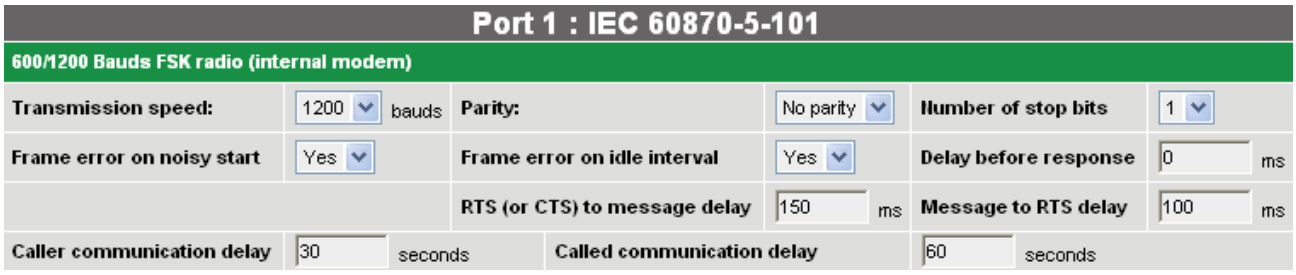
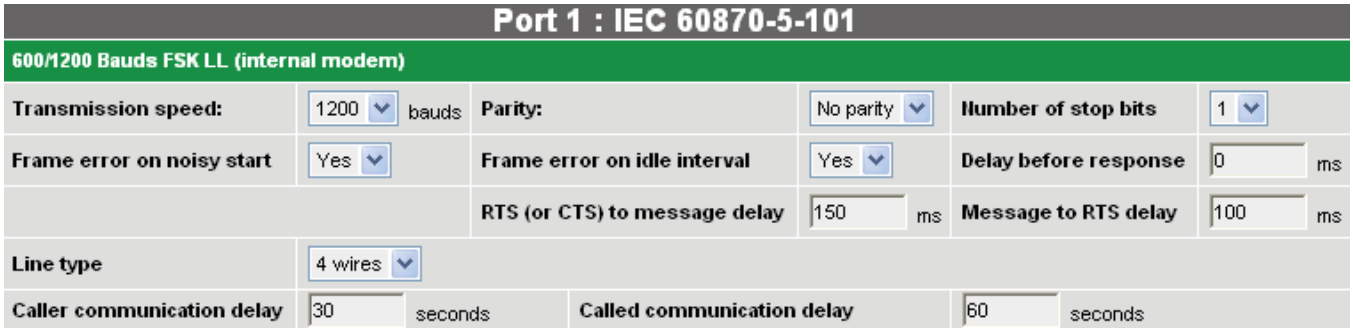
Figure 50: FSK or FFSK Radio Medium



- **FSK LL 600/1200 baud medium** (internal modem):

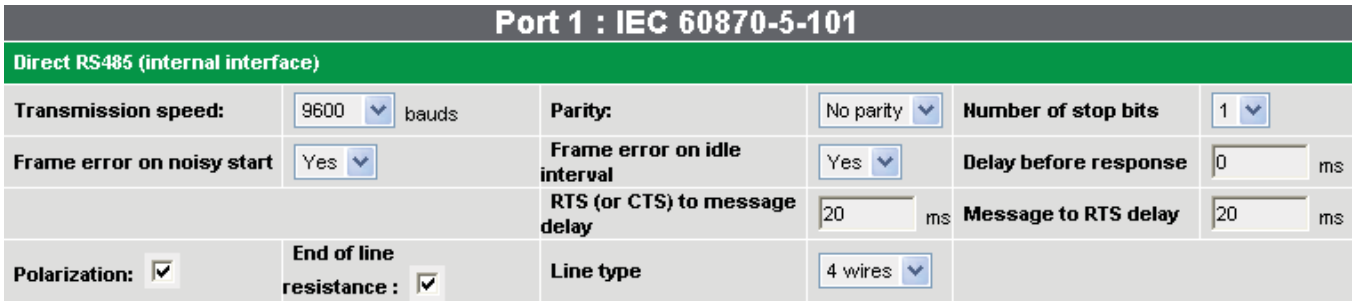
  Line type: Configuration of the type of LL line installed between the T200 P unit and the Supervisor. There are two possible configurations: 2-wire or 4-wire.

Figure 51: FSK LL 600/1200 Baud Medium



- **RS485 medium** (internal modem):
  - **Polarization:** Activates line polarization at the T200 P unit end. The RS485 line should be polarized at one termination, generally at the Master end.
  - **End-of-line resistance:** Activates the load résistance at the T200 P unit end. The RS485 line should be loaded at both its terminations.
  - **Line type:** Choice of type of transmission used: 2-wire or 4-wire.

Figure 52: Direct RS485



- **GPRS medium** (internal modem):
  - **GPRS operating conditions on T200 P unit:**

    For GPRS communication between the T200 P unit and the Supervisor to be able to operate, certain essential conditions must be obtained from the network operator:

The T200 P unit must have a fixed IP address assigned by the operator.

The GPRS connection will not be able to operate if the T200 P unit has a dynamic IP address, because at the Supervisor end it will not be possible to know the new IP addresses assigned to the T200 P unit by the operator following a reassignment. As a result, it will not be possible to initialize protocol communication from the Supervisor.

Likewise, it will not be possible either to log on to the embedded Web server of the T200 P unit remotely from an Ethernet access if the IP address of the T200 P unit is not known.

The only way to know the IP address of the T200 P unit in this case is to log on locally (on site) to the embedded Web server of the T200 P unit via an USB access; which implies going to the site for each enclosure each time an IP address is reassigned.

When the T200 P unit is connected to the GPRS network, the IP address assigned to the T200 P unit is displayed in the "Server IP address" field, ("Maintenance/IP server ports" page, see Figure 53). It is this address that must be used at the Supervisor end to connect to the T200 P unit via Ethernet or via the protocol.

NOTE: When connection to the GPRS network is not established, dashes ("-") are displayed in place of the IP addresses.

Figure 53: Communication Interface

IP ports used by the T200 P unit must be opened by the operator:

A number of ports are used for the T200 P unit application. The list of ports used can be viewed in the "Maintenance/IP server ports" page of the T200 P unit Web server (Figure 54). All of the ports mentioned in this page must be opened at the GPRS operator level for the functions associated with these ports to operate. If this is not the case, select different port numbers on this page to match port numbers available at the operator end.

Example: "HTTP server port" number 80 is not open for the operator "Orange." A port number greater than 1024 should be configured on the T200 P unit to have an open port from this operator.

Figure 54: IP Ports Configurations

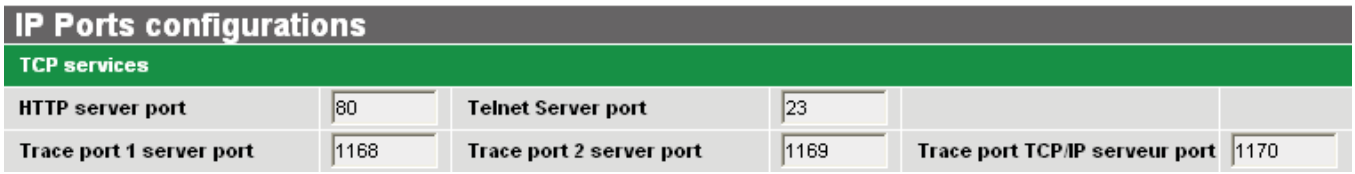


Figure 55: GPRS Parameters

Port 2					
GPRS					
Access Point Name	internet-entreprise		**PIN Number**	0000	
Dayly disconnect	☐	**Disconnect hour**	0	**PPP session timeout**	5 min
Specific Ping IP Address		0.0.0.0		Test Ping	
Ping time interval	4 min	**Ping attemps**	3	**Ping timeout**	5 s
Authentification	☐	**Login**		**Password**	
IMEI code	011202000025048				

— **Configuration of GPRS parameters (see Figure 55):**

Access Point Name (APN): Name of the access point for connection to the GPRS network. This name is generally given by the operator who provides access to the GPRS network. (e.g., "internet-entreprise" for the operator Orange).

PIN number: Same as for GSM modem.

Daily disconnect: One of the special features of GPRS operation is that in some cases of network unavailability, the T200 P unit does not detect this link break. The T200 P unit will remain connected continually to the network (unavailable) even though the physical link is broken. The T200 P unit can remain indefinitely in this mode and will no longer have a means of reconnecting to the network, even if is available again, because to do so it would have to be forced to disconnect from the network to then be able to reconnect.

Without a means of forcing automatic disconnect/reconnect, the unit will not, by itself, be able to restore connection to the network.

The "Daily disconnection" option has been provided to allow T200 P unit disconnection from the GPRS network to be forced automatically so as to reconnect it immediately afterward. This disconnection can be programmed for a fixed time each day by means of the "Disconnection time" setting.

In the worst case scenario, the T200 P unit may remain, for a maximum of 24 hours, without any real connection to the network (for example, a brief network malfunction occurring just after the daily disconnection time).

Disconnect hour: Configuration of the selected daily disconnection time according to the criteria described previously in "Daily disconnection." This option should be entered only if the "Daily disconnection" option is used.

PPP session timeout: Configuration of the delay maximum before disconnection of T200 P unit from GPRS network, in case of no data transfer detected by the T200 P unit.

Specific ping IP address: The ping makes it possible to verify and measure the quality of the equipment's connection with another device connected to the IP network. This configurable parameter can determine to which IP address the packet will be sent, corresponding to the ping allowing this quality to be measured.

Configure, for example, a known Web server IP address or possibly that of the supervisor, provided that the latter incorporates a known, fixed IP address. The configured address must correspond to a standard IP address format, i.e., be in the form of four values, of at most, three digits separated by a dot (e.g., 192.168.2.101).

Operating principle of the regular ping test:

For the T200 P unit application, the regular ping test is used primarily as a means of extending connection to the GPRS network, when the Supervisor is no longer capable of performing protocol communication with the T200 P unit, even though the GPRS network is still operational. Now, the T200 P unit is designed to monitor the IP data packet flow reaching it via the GPRS network.

A 5-minute delay ("PPP session timeout") automatically disconnects the T200 P unit from the GPRS network if no IP data flow reaches the T200 P unit. Accordingly, if the T200 P unit is disconnected from the network, the modem will be reinitialized, making the T200 P unit unavailable for 1 minute, the time needed for reconnection of the modem to the GPRS network.

To avoid this drawback, the regular ping test is used to prevent disconnection of the T200 P unit when the problem is exclusively due to the Supervisor and not to a network problem. If the T200 P unit is still connected to the GPRS network, there is no reason to disconnect it because of a non-existent IP protocol flow.

As soon as a ping address has been configured in this field, the T200 P unit will try every 4 minutes ("Ping time interval") to send a ping to the specified IP address. Accordingly, an IP data flow will return to the T200 P unit and the latter will not turn off the connection to the network.

If the result of the ping test is satisfactory, the T200 P unit will remain connected to the network, because it knows that it is available. The T200 P unit will then do nothing in particular except for the next ping test following the next 4 minutes elapsed.

If the result of the ping test is unsatisfactory, after an extra minute the T200 P unit, seeing no IP data flow for the last 5 min., will disconnect from the network automatically (modem reset), and then try (after the end of modem initialization) to reconnect to the network again.

If the network is still not available, the T200 P unit will again request the modem to reinitialize immediately, and this indefinitely until the next detection of the network.

This phase of initialization and reconnection to the network requires approximately 1 minute for the GPRS modem (see enclosed diagram). If the ping address is set to "0.0.0.0" (default value), the regular ping test is deactivated.

NOTE: The regular ping test method is preferable to the "Daily disconnection" method because, for the regular ping test, network disconnection lasts 5 minutes or less, during a brief malfunction (case of network disconnection just after the ping test).

NOTE: The regular (or manual) ping test sends to the specified IP address the smallest possible number of data packets (equivalent to 0 byte), to avoid causing the extra cost of an IP data flow transfer.

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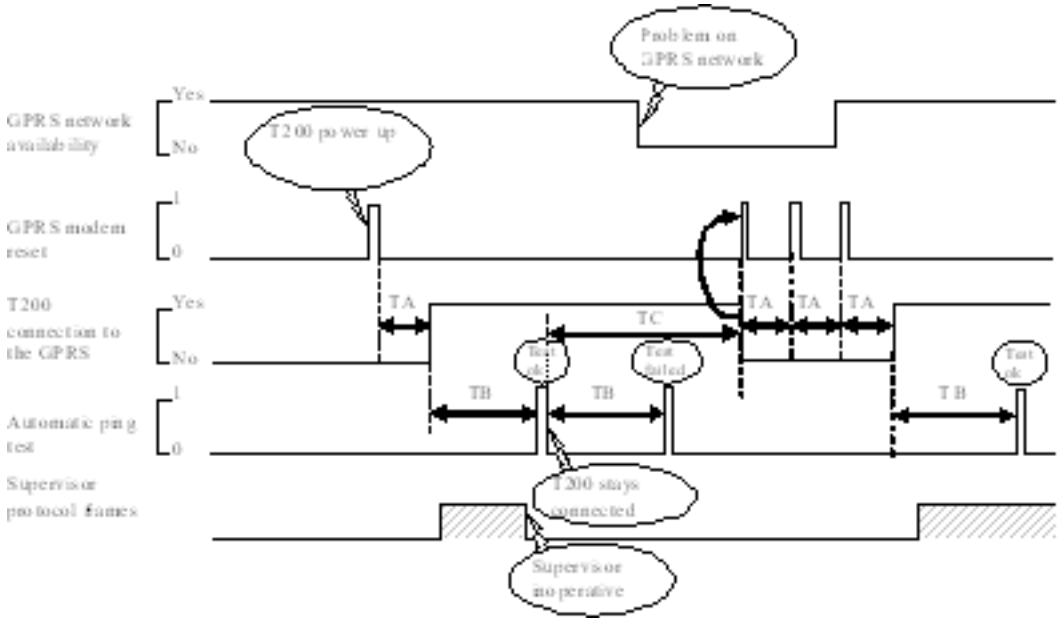
Figure 56: Ping Test Management



TA = Time for modem initialization + connection to the GPRS network (approximately 1 minute)
TB = Ping test period (4 minutes)
TC = Modem reset time (= 5 min.) if IP data flow non-existent on the T200 P unit

Figure 57: Test Ping

Test Ping: Allows manually activation of the ping test. Clicking this button starts a manual ping test. This manual test is generally used to verify T200 P unit connection to the GPRS network immediately.

The T200 P unit then displays the result of the test in a specific window (see Figure 57). There are two possible results following this test: "Ping Ok" or "Ping failed." See Figure 57.

Ping time interval: Delay between two successive automatic "Test ping."

Ping attempts: Number of maximum attempts for the "Test ping" process in case of no response from remote IP address.

Ping time out: Maximum delay to wait for the response during the "Test ping" to define "Ping error."

Authentication: When the GPRS network requires authentication during the connection phase, it is possible in such cases to activate this function by checking the corresponding box. The authorized encryption protocols are: PAP, CHAP, MSCHAP, MSCHAP V2

Login: Configuration of the login used for authentication. Configure this field only if the "Authentication" option has been checked.

Password: Configuration of the password used for authentication. Configure this field only if the "Authentication" option has been checked.

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Figure 58: Port Trace in the Event of a Connection to the GPRS Network

```
08:48:34.474    MODEM - Power up
08:48:35.986    MODEM - Command mode
08:48:36.994    MODEM - Tx : ATE0
08:48:39.518    MODEM - Tx : AT&S0
08:48:42.045    MODEM - Tx : AT
08:48:43.071    MODEM - Rx : OK
08:48:44.079    MODEM - Tx : AT+CPIN?
08:48:45.120    MODEM - Rx : +CPIN: SIM PIN
08:48:45.120    MODEM - Tx : AT+CPIN=****
08:48:47.230    MODEM - Rx : OK
08:48:47.230    MODEM - Tx : AT+CLCK="SC",0,****
08:48:49.770    MODEM - Tx : AT+CREG?
08:48:50.807    MODEM - Rx : +CREG: 0,1
08:48:50.807    MODEM - Tx : AT+CSCA=0689004000
08:48:54.818    MODEM - Tx : AT+CMCF=1
08:48:57.347    MODEM - Tx : AT+CSAS
08:48:59.875    MODEM - Tx : AT+CMEE=0
08:49:02.403    MODEM - Tx : AT&C1
08:49:04.929    MODEM - Tx : AT&D2
08:49:07.455    MODEM - Tx : AT+IPR=0
08:49:09.983    MODEM - Tx : ATS0=1
08:49:12.509    MODEM - Tx : AT+WIND=0
08:49:15.039    MODEM - Tx : AT+CICB=0
08:49:17.567    MODEM - Tx : AT+CBST=7,0,1
08:49:20.101    MODEM - Tx : AT&W
08:49:32.706    MODEM - Tx : AT+CGCLASS?
08:49:33.720    MODEM - Rx : +CGCLASS: "B"
08:49:33.720    MODEM - Tx : AT+CGDCONT=1,"IP","internet-
company"
08:49:36.248    MODEM - Tx : AT+CGATT=1
08:49:38.769    MODEM - Tx : AT+CGREG?
08:49:39.784    MODEM - Rx : +CGREG: 0,1
08:49:39.784    MODEM - Tx : AT+CGACT=1,1
08:49:42.307    MODEM - Tx : ATD*99***1#
08:49:43.327    MODEM - Connection
08:49:44.335    MODEM - PPP link: UP -> ESTABLISH ()
08:49:44.350    MODEM - PPP link:  OPEN -> AUTH ()
08:49:44.363    MODEM - PPP link:  PAP: Local successfully
authenticated
08:49:44.363    MODEM - PPP link:  SUCCESS -> NETWORK ()
08:49:44.363    MODEM - PPP link:  IPCP UP -> NETWORK ()
08:49:44.400    MODEM - PPP link:  IPCP CONFIGURED ->
NETWORK ()
08:49:44.401    MODEM - PPP link: connected, local=90.95.65.78,
dest=212.234.96.90
08:49:44.401    MODEM - GPRS modem initialized
```

NOTE: To verify that the modem is correctly connected to the GPRS network, it is possible to view the trace of the port corresponding to the GPRS modem. The modem starts by initializing the GSM connection and then the GPRS connection. Accordingly, following the AT commands for connection to the GSM network, can be found the commands relating to GPRS connection. At the end of those commands, the trace should indicate "GPRS modem initialized" with also the indication of the IP addresses of the T200 P unit, assigned by the operator (local=xxx.xxx.xxx.xxx), and the IP address of the GPRS gateway provider (dest=xxx.xxx.xxx.xxx) (see Figure 58).

Modem connection status:

Same comment as for the GSM modem.

Switch Control Parameters

Objective: Set processing of the switch control for each channel.
Access: "***Settings/Control & Automation***" page (Figure 59).

Remote configuration: The @ sign alongside each parameter of the "*Control and automation*" page allows an external address to be configured so as to be able to change the parameter's configuration from the Supervisor via the protocol used (if the latter permits).

There are four possible control options: **Standard, PM6, CI2, Other.** The management of switch position control and monitoring signals is specific to each type of switch.

Figure 59: Control & Automation Page

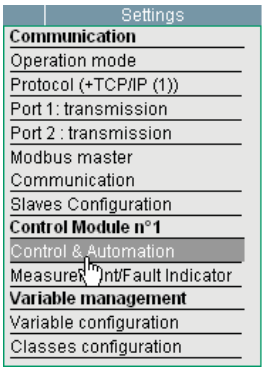
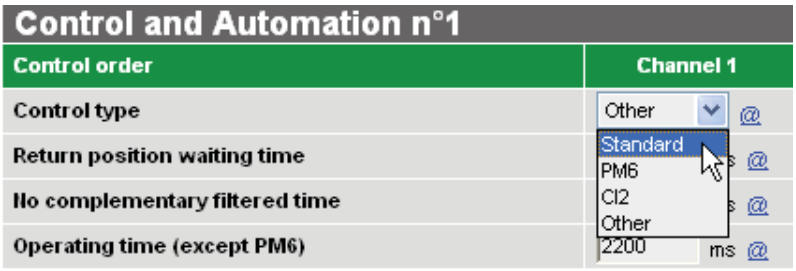


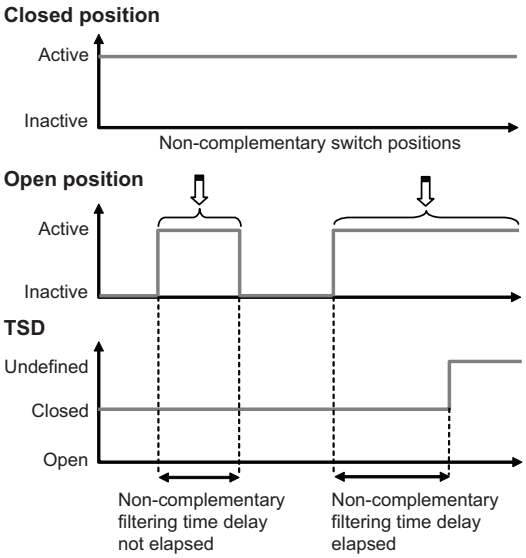
Figure 60: Control and Automation Options



NOTE: The "CI2" and "Other" options are not managed at present.
The "PM6" option is managed but applies only to the T200 P unit.

The "Standard" option applies to the main cubicles used with a T200 P unit, in particular, Merlin Gerin cubicles of type SM6 or RM6.

Figure 61: Non-complementary Switch Positions/Filtering Time Delay



- Filtering principle for indication inputs related to remote controls:

  The interface between the T200 P unit and the switch includes two electric signals for motorization control (CO: Opening control / CF: closing control) and two signals for the current switch position (O: open position / F: closed position).

  The T200 P unit systematically performs a consistency check on the positions read: Under normal operating conditions it is impossible to have the "open" and "closed" signals either not present or occurring simultaneously. However, this is possible when the system malfunctions. The verification of these states is completed each time the TSD variables are updated.

  In the case of non-complementary values, filtering is applied and the old TSD value is kept during a configurable time delay (non-complementary filtered time parameter). If the non-complementary persists after the time delay, it may be due to a fault relating to the signals delivered by the switch, and the "undefined" state is finally indicated in the TSD associated with the position.

- Principle for switch position order processing: The T200 P unit internal control manager inhibits any order until the previous order has been completed. The order processing status can be found by viewing the events from the supervisor or in the local event log. The events generated according to the order processing status are listed in Table 1:

Table 1: Order Processing Status

Phase	Event
Receipt of a switch order	TCD xx – Switch state – Order CR order in progress
End of order processing	CR end of order
End of degraded order processing	CR external error or CR severe fault CR end of order

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Standard Type Control

NOTE: This switch option does not apply to the T200 P unit; it applies only to the T200 P unit combined with a Merlin Gerin™ SM6 or RM6 type switch.

Figure 62: Control Order Page

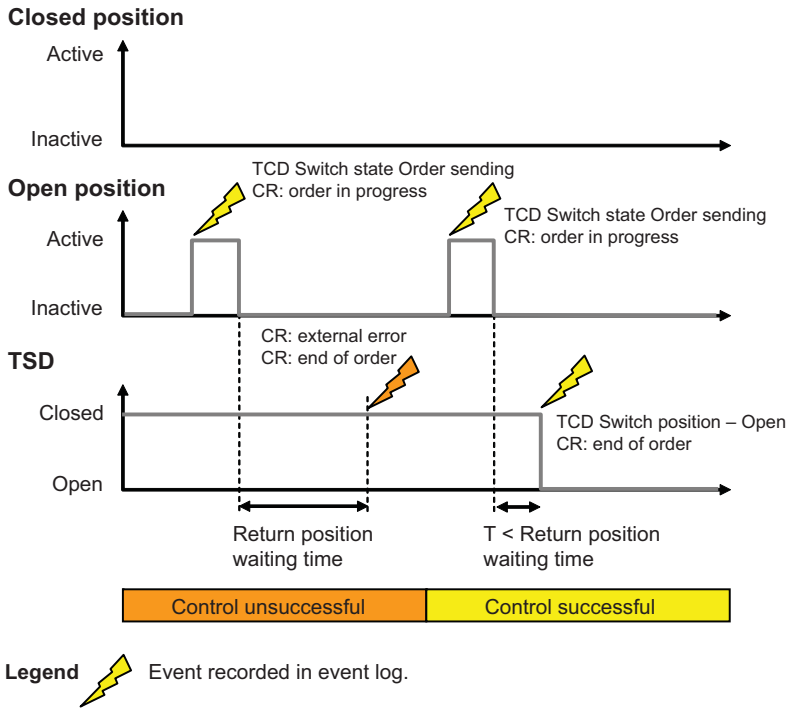
Control order	Channel 1
Control type	Standard @
Return position waiting time	15000 ms @
No complementary filtered time	10000 ms @
Operating time (except PM6)	2200 ms @

The principle of an order on the switch is to activate the switch control signal (24 V or 48 V polarity depending on the model) for a determined time (Operating time parameter). With "Standard" control, the duration of the order is fixed by this time delay and does not depend on the time taken by the switch to change position.

The Open and Closed switch position inputs are read constantly throughout the duration of the order with a consistency check in order to update the associated position TSD variable (see page 55).

After the control relay has fallen, the order is considered as completed by the T200 P unit when the switch indicates a position in conformity with the order (the TSD is updated with the new status). The order is considered in error (e.g., external error) if the position is not in conformity with the requested order or if undefined after a loss of position filtering time delay (Return position waiting time).

Figure 63: Control Order Management



PM6 Type Control

NOTE: The "PM6" configuration applies to the Merlin Gerin PM6 type switch.

Figure 64: Control Order Page for PM6 Type Control

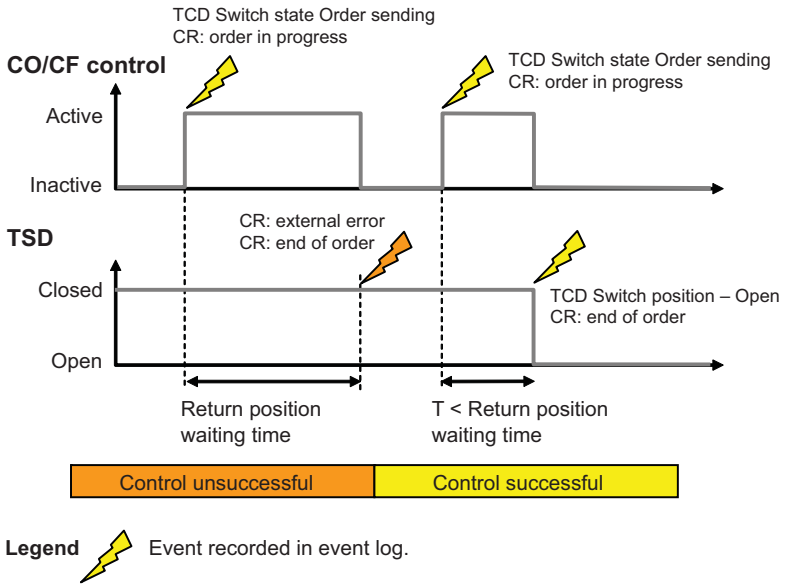
Control order	Channel 1
Control type	PM6 @
Return position waiting time	15000 ms @
No complementary filtered time	10000 ms @
Operating time (except PM6)	2200 ms @

With this type of switch, the goal is to apply the motor control signal until the requested position is obtained. This control will be maintained only during a configurable limited period (Return position waiting time parameter), and in the event that the position indicated by the TSD variable is not that which is expected by the T200 P unit (case of degraded control).

With this type of switch, the time for execution of the electrical order depends exclusively on the time taken by the switch to change position.

The Open and Closed switch statuses are read constantly with a consistency check in order to update the associated position TSD variable (see filtering principle for indication inputs related to remote controls).

Figure 65: Consistency Check for Open and Closed Switch Statuses



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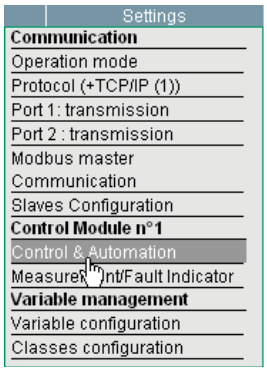
Parameters of Various Options

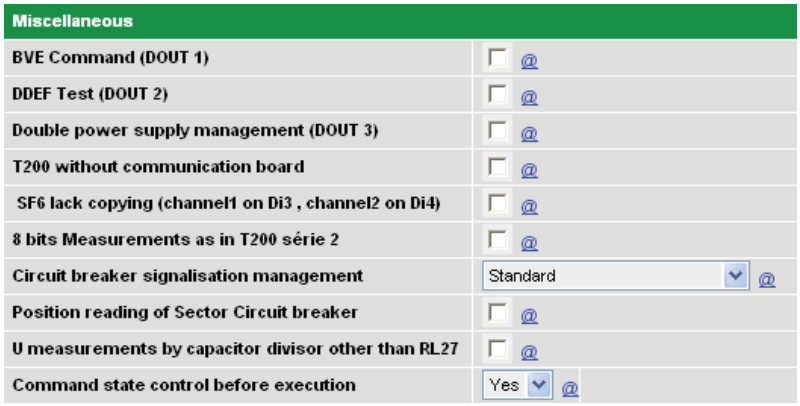
Figure 66: Settings/Control & Automation Page



Access: "***Settings/Control & Automation***" page (Figure 66).

Some specific options allow operation of the T200 P unit to be customized for the needs of certain users. One must be a system administrator to be able to modify these options. The T200 P unit is generally delivered without these specific options being active (factory settings).

Figure 67: Customized Options



The list of these configurable options is described in detail below:

- **BVE control (DOUT 1)**

  When this option is selected, digital output DOUT 1 activation causes an external indicator lamp to flash.

  This output is active as soon as the internal fault detector of the T200 P unit detects and indicates the presence of a phase or ground fault.

- **FPI test (DOUT 2)**

  When this option is selected, digital output DOUT 2 is activated whenever a current exceeds the phase or ground event detection threshold configured on the T200 P unit.

  The output goes low as soon as the current level returns below the threshold.

- **Double power supply management (DOUT 3)**

  When this option is selected, digital output DOUT 3 is used for the double mains power supply management option if the latter is installed in the enclosure.

  This output can automatically activate the power supply changeover relay in the event of a power outage on the active channel.

- **T200 P unit without COM card**

  This option should be used when the T200 P unit includes no COM card in the equipment.

- **SF6 lack copying (channel1 on DI3, channel2 on DI4)**

  To be compatible with old versions of T200 P unit (Series 1 and 2), the information "SF6 lack" (connected on Harting switch connector – pin 9) is internally associated to DI3 (channel 1) or to DI4 (channel 2). When the "SF6 lack" is detected, the DI3 (or DI4) is activated at the same time.

  NOTE: If this option is checked, the DI3 and D 4 are no longer available as digital inputs because they are already defined as “SF6 lack.”

Table 2: Switch TSS Management—Standard Mode

Connector Pin	Marking	Function
1	—	0 V
2	CC	Closing control
3	OC	Opening control
4	O	Open position
5	F	Closed position
6	+	+ V
7	**ST**	**Switch locked**
8	**HTA**	**MV voltage present**
9		**Not connected**
10		Not connected

Table 3: Switch TSS Management—Ground Switch by TSD or Specific 1 Mode

Connector Pin	Marking	Function
1	—	0 V
2	CC	Closing control
3	OC	Opening control
4	O	Open position
5	F	Closed position
6	+	+ V
7	**ST F**	**Grounded Closed position**
8	**ST O**	**Grounded Open position**
9		**Not connected**
10		Not connected

Table 4: Switch TSS Management—Free TSS Mode

Connector Pin	Marking	Function
1	—	0 V
2	CC	Closing control
3	OC	Opening control
4	O	Open position
5	F	Closed position
6	+	+ V
7	**B1**	**Free 1**
8	**B2**	**Free 2**
9		**Not connected**
10		Not connected

- **8-bit measurement**

  By default, on the T200 P series 3 unit, the current (or voltage) measurements are coded on 16 bits, whereas on the preceding series they were coded on 8 bits. By selecting this option, however, it is possible to make the T200 P unit compatible with the old-generation T200 P units. This option is used especially when a Supervisor already polls T200 P units of an old generation with measurements on 8 bits. Now, a given Supervisor can hardly read measurements in 2 different formats.

  NOTE: It is important to use the "Off Line Configurator" to generate a configuration file compatible with this option, because the option also implies a change in configuration of the T200 P unit's internal variables.

- **Circuit switch management**

  There are several ways of acquiring status information coming from the switch (pins 7, 8, and 9 of the 10-pin Harting connector for cubicle connection). The option chosen affects the way in which the T200 P unit processes this information. There are several possible choices for this option:

  — **Standard:** This is the factory settings. The connections for the switch link corresponding to this mode are shown in Table 2.
  In this mode, the presence of the "*Switch locked*" signal inhibits the execution of orders on the switch. The "*MV voltage present*" signal is used by the ACO automatic control.

  — **Ground switch management by TSD:** As standard, a single signal coming from the switch is used to give the T200 P unit the status of the ground switch (pin 7 of the 10-pin Harting connector).
  By selecting this option, an additional input (pin 8) is used to manage the ground switch as a TSD and not a TSS. The "*Grounded Open Position*" absent and "*Grounded Closed Position*" present states inhibit the execution of orders on the switch. See Table 3.

  NOTE: The ACO automatic control cannot be used in this mode.

  — **Free TSS:** In this mode, pins 7 and 8 normally assigned to "*Switch locked*" and "*MV voltage present*" can be used freely. They have no function predefined by the T200 P unit. They are merely DIs. There is no inhibition of execution of orders on the switch whatever the status of the free inputs. See Table 4.

  NOTE: The ACO automatic control cannot be used in this mode.

  — **Specific mode 1:** This mode is similar to the "Ground switch management by TSD″ mode, with an additional special feature: When the T200 P unit is in local mode, all orders to the switch are inhibited. The automatic controls can therefore no longer operate in Local mode. The connection system is identical to the "Ground switch management by TSD" mode.

  NOTE: Same comment as for the previous option concerning the possibility of using the "Off Line Configurator" to generate a configuration file compatible with this option.

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- **Position reading of sector circuit breaker**

  Option only available when the AC supply protection is made by circuit breaker instead of fuse holder. When this option is used, the T200 P unit manage DI5 to indicate when circuit breaker protection is open.

- **U measurements by capacitor divisor other than RL27**

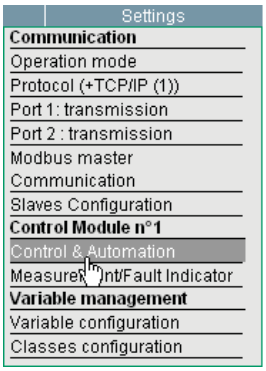
  Case of voltage measurement done by capacitor divisor (RL27 type) but without using the calibration process done by RL27.

Automation Parameters

Access: "***Settings/Control & Automation***" page (Figure 68).

Sectionalizer Automation Control

Figure 68: Settings/Control & Automation Page



The purpose of this automatic control is to order opening of the MV switch managed by the T200 P unit following the detection of a number of events during unsuccessful slow resetting cycles for the upstream circuit breaker. The sectionalizer automatic control therefore converts the switch into a sectionalizing switch.

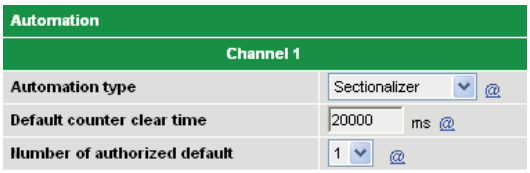
For the automatic control to work, the T200 P unit must be provided with the event current detection function. For automatic control to operate on a channel, it must be selected for that channel (**Automatic type** parameter). It is possible to assign the presence of automatic control or not channel by channel. All of the channels of the T200 P unit can be configured with this automatic control or not.

Automatic control can be enabled or disabled, in general on the T200 P unit (TCD 9), remotely from the Supervisor or locally via the CONTROL panel of the T200 P unit.

NOTE: When the "automatic control Enabled/Disabled" TSD (TSD 9) is in On position, the type of automatic control on a channel cannot be changed. Return TSD 9 to Off position to change the type of automatic control on one of the channels. Likewise, it is not possible to send a remote control to the TSD 9 to place it in On position, if no automatic control is active on one of the channels of the corresponding CONTROL module.

Manual control of the switches remains possible in “Local” mode from the CONTROL panel or in "remote" mode from the Supervisor, even if automatic control is active in On position.

Figure 69: Sectionalizer Settings



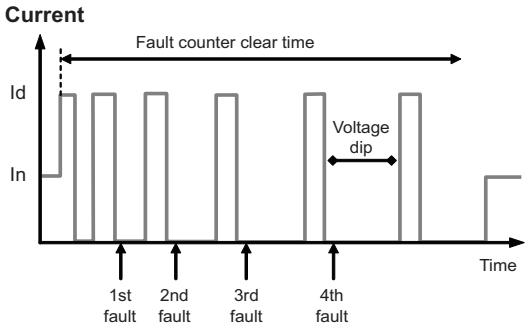
Operation:

In normal operating conditions, the line is energized and the switch is closed. The automatic control system sends an opening order to the switch if:

- the switch is closed;
- the counted number of events is reached;
- the current fault has disappeared;
- the MV voltage is not present.

NOTE: The "Rapid" fault can be counted as the first fault detected by the T200 P unit if the time to detect the "slow" fault configured on the T200 P unit is less than the actual time of presence of the first "rapid" fault, or if the actual time of presence of the rapid fault is the same as that for the slow fault (that depends on the network configuration).

Figure 70: Fault Counter Clear Time



The enclosure must be powered from a low-voltage source generated by the MV line on which the unit is installed.

Table 5: Configuration Parameters—Sectionalizer Automation

Parameter	Description	Configuration Range
Automatic type	Choice of automatic control type. -> Choose Sectionalizer	None or Sectionalizer or Changeover switch or BTA
Fault counter clear time	Time after which the automatic control system is reset if the conditions of automatic control action are not met. This time begins after first detection in the fault elimination cycle. Must be greater than the total time of the source substation resetting cycle.	20000–240000 ms (in increments of 5000 ms)
Number of authorized default	Number of faults detected by the T200 P unit before actuating channel opening by automatic control.	1–4

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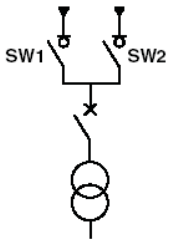
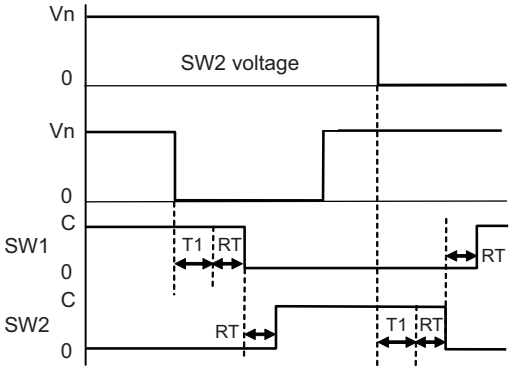
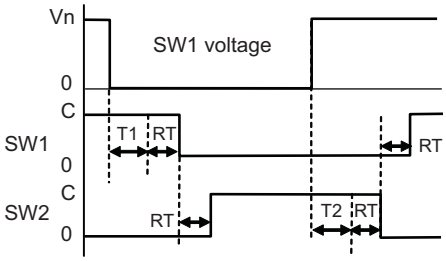
ATS Automatic Control (Source Changeover)

Figure 71: ATS Configuration





Network ATS – Semi-auto mode
RT = Switch response time



Network ATS – Auto-SW1 mode
RT = Switch response time

Automatic changeover control manages automatic changeover of voltage sources of the MV secondary distribution network to ensure maximum availability of voltage, in case of malfunction of one of the voltage sources.

Accordingly, upon disappearance of the voltage on one channel, changeover to the other channel is performed automatically, depending on the options configured.

To activate "ATS" automatic transfer system on a channel, simply set the Type of Automatic Control variable in the specific page of the embedded Web server ("Control and Automation" page):

Several operating modes can be selected (**Operating mode** parameter), namely:

- **SW1⟶SW2 or SW2⟶SW1 mode**

  This option allows only one changeover to be enabled. Automatic transfer system switches only from the priority channel to the backup channel. Automatic transfer system then remains on that channel.

- **Semi-Auto SW1↔SW2 mode**

  In the event of a voltage loss on the active channel, automatic transfer system switches to the other channel after a time delay T1. In this mode, there is no concept of priority source. Changeover to one or other of the channels takes place as soon as the changeover conditions are met.

- **Auto SW1 or Auto SW2 mode**

  In this mode, one can define a concept of priority of one channel relative to the other (channel 1 or 2). Automatic transfer system remains on the priority channel so long as the voltage associated with that channel is present. In the event of a voltage loss on the priority channel, automatic transfer system switches to the other channel after a time delay T1. After the changeover, return to the priority channel occurs if the voltage on that channel is present during a time delay T2.

Changeover sequences

In the event of voltage loss on the normal channel, changeover involves opening the normal channel after time delay T1, and then closing the backup channel.

Table 6: Network ATS Configuration

Parameter	Description	Configuration Range
Automation type	Choice of automatic control type. → Choose Network ATS [1/2] or Voltage time	None or Sectionalizer or ATS [1/2] Network or Voltage time
Permutation waiting type (T1)	Waiting time for stability of voltage disappearance on the channel that was operational before the start of the changeover cycle	100 ms to 200s (in increments with 100 ms)
Time before returning on normal channel (T2)	Waiting time for stability of voltage return on the normal channel before return to that channel	5 s to 60 s (in increments with 1 s)
Type	Choice of changeover type (see details of operation above)	SW1 → SW2 or SW2 → SW1 or SW1 ↔ SW2 or Auto-SW1 or Auto-SW2

Figure 72: ATS Network Setting

Automation	
Channel 1	
Automation type	ATS[1/2] Reseau @
Permutation waiting time	1000 ms @
Time before returning on normal way	5 s @
Type	SW1->SW2 @
Channel 3	
Automation type	None @

Changeover sequence

Changeover takes place if the following conditions are met:

- Automatic control enabled.
- Position of channel 1 and 2 switches complementary: TSD variable SW1 closed position and SW2 open position (or SW2 closed and SW1 open).
- No fault current on the two channels
- "MV ground switch" absent on the two channels;
- MV voltage absent on the enabled channel;
- MV voltage present on the other channel.

Return to the main channel for the “AUTO” modes occurs if:

- the priority channel is open;
- the MV voltage on the priority channel is present during time delay T2.

Special feature of reset upon MV voltage return

When a current fault is stored in memory on one of the two channels managed by ATS automatic control, MV presence is necessary on both channels at the same time to reset the memory of this fault. This applies even when only one of the two channels has been configured with active reset upon MV voltage return.

Voltage Time Automatic Control

Voltage Time (VT) automatic control is used for certain switches without current sensors not allowing the network to be reconfigured by means of Sectionalizer automatic control.

This automatic control system works on the principle of opening all of the switches on the network in the event of a voltage loss (opening of upstream circuit breaker) and gradually restoring the network power by closing the switches in succession, one after the other.

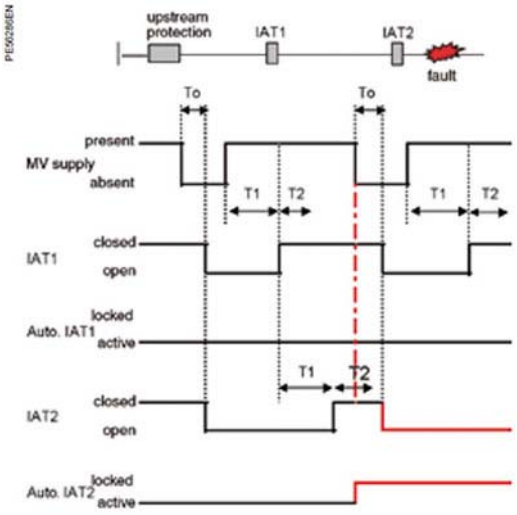
If closing a switch causes line tripping, the switch will be blocked in open position and the automatic control system will restart, restoring power in the healthy upstream section, i.e., the part of the electrical network not experiencing a current fault.

The circuit-breaker upstream protection should also be provided with the Voltage Time automatic control function.

For this function, the following options are required on the T200 P unit:

- Voltage measurement and monitoring.
- Voltage Time automatic control enabled on the channel (by configuration).

Figure 73: Configuration of Voltage Time Automatic Control



Legend:
T0: Voltage failure timeout (0 to 327 s in 0.1 s increments)
T1: Closing timeout (0 to 327 s in 0.1 s increments)
T2: Monitoring timeout (0 to 327 s in 0.1 s increments)

Operation

- The line is energized and the switch is closed.
- Mains voltage loss: switch opening following a timeout T0 (Voltage failure timeout parameter).
- Voltage return: switch closing following timeout T1 (Closing timeout parameter) and monitoring of voltage maintenance during a timeout T2 (Monitoring timeout parameter).
- Voltage loss during timeout T2: switch opening and automatic control locking.
- The automatic control function is reinitialized following locking by the “Reset automation” push button on the local CONTROL panel.

NOTE: The delay "T1" must be different on each T200 P unit so that the automation VT can work properly (the lower value on the T200 P unit nearest the circuit breaker). The VT function can be activated or deactivated

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from the local control panel or by a telecontrol order. The switches can be controlled manually in “Local” mode.

Figure 74: Configuration/Control & Automation Page

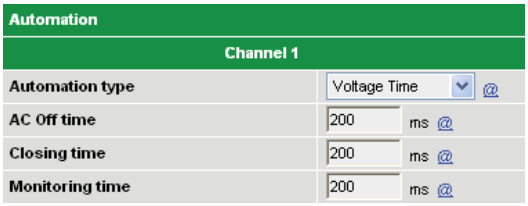


Table 7: Configuration Parameters—Voltage Time

Parameter	Description	Configuration Range
Automation type	Choice of automatic control type. →Choose Voltage Time	None or Sectionalizer or Changeover switch or Voltage Time
AC Off time	Waiting time before switch opening following mains voltage loss	0 to 32700 ms (in 100 ms increments) Default: 200 ms
Closing time	Waiting time before switch reclosing following mains voltage return	0 to 32700 ms (in 100 ms increments) Default: 200 ms
Monitoring time	Time during which maintenance of the mains voltage is monitored following reclosing of the switch	0 to 32700 ms (in 100 ms increments) Default: 200 ms

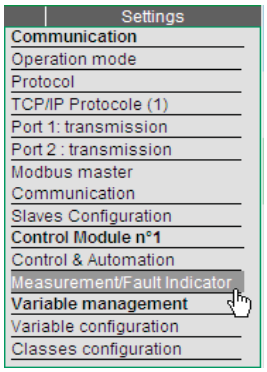
Parameters—Event Detection Module

Access: "***Measurements/fault detector configuration***" page.

The **Measurements/fault detector** page (see Figure 75) allows setting of the parameters relating to measurements and data, namely:

- Type of mains frequency.
- Voltage and current measurement parameters.
- Data thresholds and time delays.

Figure 75: Measurements/Fault Detector Page



Configuration of Network Characteristics

Allows definition of the MV network characteristics

Figure 76: MV Network Characteristics Page

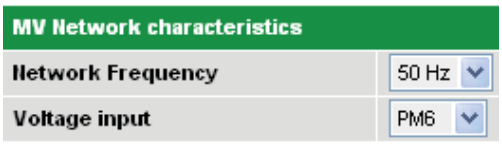


Table 8: Configuration Parameters—Network Characteristics

Parameter	Description	Configuration Range
Network frequency	MV network frequency	50 Hz or 60 Hz (default 50 Hz)
Voltage input	Type of sensors used for measurement	Set in factory on PM6

NOTE: Shaded parameters are factory preset and can be modified only by the manufacturer.

Configuration of Voltage Measurements

To perform voltage measurement, the T200 P unit needs to know certain parameters relating to the characteristics of the MV network and the type of transformer used for measurement:

- PT transformation ratio.
- Type of arrangement for the voltage tap (star or delta).
- Network voltage rating value.
- Voltage absent and present detection thresholds and acknowledge time.
- Residual voltage (phase-to-phase voltage imbalance).

NOTE: The "*Voltage present threshold*" and "*Voltage absent threshold*" parameters together with the "*Time delay for taking into account voltage*

present and voltage absent" parameters can generate the "*MV voltage present*" telesignal (TSS73) delivered by the T200 P unit.

Figure 77: Voltage Configuration Page

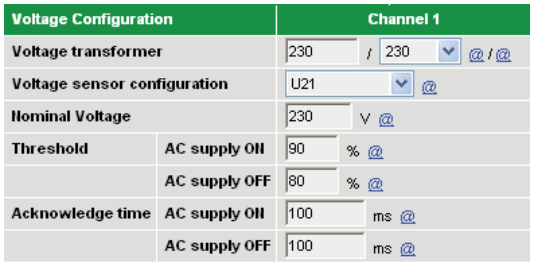


Table 9: Configuration Parameters—Voltage Threshold

Parameter	Description	Configuration Range
Voltage transformer	Value of the transformer primary/secondary ratio used for voltage measurement	Primary: 100 to 36000 Secondary: 100/√3 to 240 V (default: 230 / 230)
Voltage sensor configuration	Choice of type of voltage sensor setup	U21 or U21_U32 or U21_U32_U13 or V1 or V1_V2 or V1_V2_V3 (default: U21)
Nominal voltage	MV network voltage rating value.	20 to 36000 V (default: 230 V)
Threshold AC supply On	Minimum percentage of the voltage rating to define "MV voltage present – Yes" TSS	70% to 120% (default: 90%)
Threshold AC supply Off	Maximum percentage of the voltage rating to define "MV voltage present – No" TSS	5% to 95% (default: 80%)
Acknowledge time AC supply On	Power-on filtering time to define "MV voltage present – Yes" TSS	100 to 80000 ms (in 10 ms increments) (default: 100 ms)
Acknowledge time AC supply Off	Power-off filtering time to define "MV voltage present – No" TSS	100 to 80000 ms (in 10 ms increments) (default: 100 ms)

Configuration of Current Measurements

There are two possible choices concerning the current transformer setup on the overhead switch:

- Three-phase current transformers (Configuration: I1, I2, I3)
- Two-phase current transformers and one homopolar current transformer (Configuration: I1, I3, I0)

The "I1 I3 I0" configuration is set by default.

The ratio of the current transformer should also be entered when current transformers having characteristics different from those provided by the manufacturer are used. The two values to be configured correspond to the Primary/Secondary ratio of the current transformers, in other words the transformation ratio of the current transformers (e.g., "500/1" means a current transformer transformation ratio equal to 500).

The default value "500/1" corresponds to the type of current transformers supplied for a PM6 switch.

Figure 78: Current Configuration Page

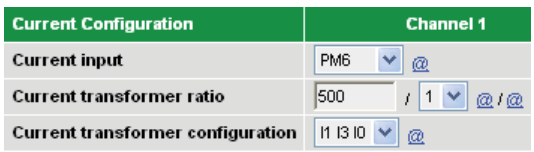


Table 10: Configuration Parameters—Current

Parameter	Description	Configuration Range
Current input	Type of sensors used for measurement	Set in factory on PM6
Current transformer ratio	Value of the current transformer primary/secondary ratio used for current measurement	Primary: 50 to 2500 Secondary: 1 or 5 (default: 500/1)
Current transformer configuration	Choice of type of current transformer setup: 3 phase current transformers or 2 phase current transformers + 1 homopolar	I1,I3,I0 or I1,I2, I3 (default: I1, I3, I0)

NOTE: Shaded parameters are factory preset and can be modified only by the manufacturer.

General rule for configuration

The thresholds Imax and I0 should be set on the T200 P unit to correspond to those set on the circuit breaker protection device upstream of the network.

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The data thresholds and time delays to be set on the T200 P unit should be slightly less than those of the upstream circuit breaker protection device so that the T200 P unit may detect presence of the event current before opening of the circuit breaker.

The current configured for the ground fault on the T200 P unit should be greater than the downstream capacitive current.

Table 11: Fault Detector Configuration

Circuit breaker protection side	T200 P unit side
I phase threshold = 350 A	I phase threshold = 330 A
I0 threshold = 45 A	I0 threshold = 40 A
Delay, I max = 250 ms	Delay, I max = 225 ms
Delay, I0 = 250 ms	Delay, I0 = 225 ms

Figure 79: Fault Passage Detection Configuration

Fault Passage Detection configuration		Channel 1
Threshold	Imax	500 A @
	I0	20 A @
Fault duration	Imax	200 ms @
	I0	200 ms @
Imax fault duration(fast mode)		50 ms @
Absence tension = Manque U carte alimentation		☐ @
Validation time		3 s @
Inrush time		3 s @
Inrush		☐ @
Reset on Voltage recovery		☑ @
RAZ voltage return duration		3 s @
Automatic FPI reset		2 h @

Table 12: Configuration Parameters—Event Detection

Parameter	Description	Config. Range
Imax threshold	Event current detection threshold I max	10–800 A (in 1 A increments) (default: 500 A)
I0 threshold	Homopolar event current detection threshold	2–160 A (in 1 A increments) (default: 20 A)
Imax fault duration	I max. fault filtering time. Any fault > Imax threshold and of a duration exceeding this time will be considered by the T200 P unit as a phase fault (if validated by voltage and current loss)	40–800 ms (in 1 ms increments) (default: 200 ms)
I0 fault duration	I0 fault filtering time. Any fault > I0 threshold and of a duration exceeding this time will be considered by the T200 P unit as an ground fault (if validated by voltage and current loss)	20–800 ms (in 1 ms increments) (default: 200 ms)
Imax fault duration (fast mode)	"Rapid" fault filtering time. Any fault > Imax threshold and of a duration exceeding this time and less than the "Time for taking into account Imax" will be indicated by the T200 P unit as a "rapid" fault	Factory preset at 50 ms
Voltage absence = PWR card voltage malfunction	If selected, the detector uses the image of enclosure mains voltage present instead of using the voltage present/absent thresholds delivered by the fault detector to define network voltage absent	Factory preset at not selected
Validation time	Mains power-off filtering time to confirm the presence of a phase or zero sequence current fault	Factory preset at 3 s
Inrush time	Inrush function filtering time. Any fault appearing during this time configured following a network voltage return will be ignored by the T200 P unit fault detector	Factory preset at 3 s
Inrush	If selected, can filter the faults resulting from closing of the upstream circuit breaker (faults due to transformer magnetization)	Checked or not checked
Reset on voltage recovery	Reset (if selected) or not of the memory of event detection indication upon network voltage return.	Checked or not checked
Reset voltage return duration	Time delay for filtering the presence of mains voltage to reset the stored fault	0–70 s (in 1 s increments) (default: 3 s)
Automatic FPI reset	Maximum time delay for indication of a current fault. At the end of this delay, the fault is automatically erased.	0–120 min. (in 5 min. increments) (default: 2 h)

NOTE: Shaded parameters are factory preset and can be modified only by the manufacturer.

Why a fault confirmation time?

In the event of a fault, any current exceeding the configured threshold should be followed by opening of the circuit breaker, to avoid incorrect fault indications.

When a current exceeds the threshold and the detection time, the algorithm of the T200 P unit fault detector waits until the circuit breaker opens (detection of voltage absent) before actually indicating the fault. The maximum waiting time for circuit breaker opening is called the fault confirmation time (Default value set in factory: 3 seconds).

NOTE: If the circuit breaker opens 1 second after the occurrence of the fault, the T200 P unit indicates the fault as soon as circuit breaker opening is detected and not just after the 3 second wait. On the other hand, if voltage absent is detected only after the 3 seconds, the fault is not indicated.

Why a reset time upon voltage return?

Once the fault has been indicated by the T200 P unit, it is stored in memory so long as the mains voltage is absent, to be able to locate the fault on the network during general interrogation of the T200 P unit from the Supervisor. By default, this memory is cleared upon mains voltage return (configurable parameter).

Why use the inrush?

In the event of circuit-breaker closing, the strong inrush currents corresponding to the currents for magnetisation of the transformers and saturation of the current transformers downstream of the fault can trigger the fault detectors for the equipment on the MV network.

Generally, this type of fault does not last very long and weakens rather quickly (significant duration < 200 ms). They can therefore be filtered easily by using the "Inrush" function, designed to ignore the presence of any fault during 3 seconds after closing of the circuit breaker.

The disadvantage of this operating procedure is that if a real fault appears during these 3 seconds, it will not be taken into account by the T200 P unit.

It is not always advantageous to use the inrush function. It depends on the network characteristics, and in particular the time of presence of the first "Rapid" fault during the upstream circuit breaker reset cycle. Several scenarios are conceivable depending on this fault duration.

The inrush should be used in the following cases:

- If there are tripping/resetting cycles (with presence of inrush currents).
- If the time delay for the first "Rapid" fault of the circuit-breaker cycle is fairly short, approximately 100 ms (rule is valid for the second "Normal" fault, but generally the second fault lasts longer than the first one).
- If the first "Rapid" fault needs to be detected.

There is no need to use the inrush in the following case (alternative solution if possibility of configuration):

- If there are tripping/resetting cycles (without presence of inrush currents).
- If the time delay for the first "Rapid" fault of the circuit-breaker cycle is fairly long, exceeding 200 ms (rule is valid for the second "Normal" fault, but generally the second fault lasts longer than the first one).
- If the first "Rapid" fault does not need to be detected.

  NOTE: The "Rapid" fault is not counted by the "Sectionalizer" automatic control).

Alternative configuration solution without inrush with the T200 P **unit**

- No inrush (standard configuration)
- Rapid Imax < 80 ms, Normal Imax > 200 ms
- Alarm to SCADA system on the TSS (Imax, rapid)

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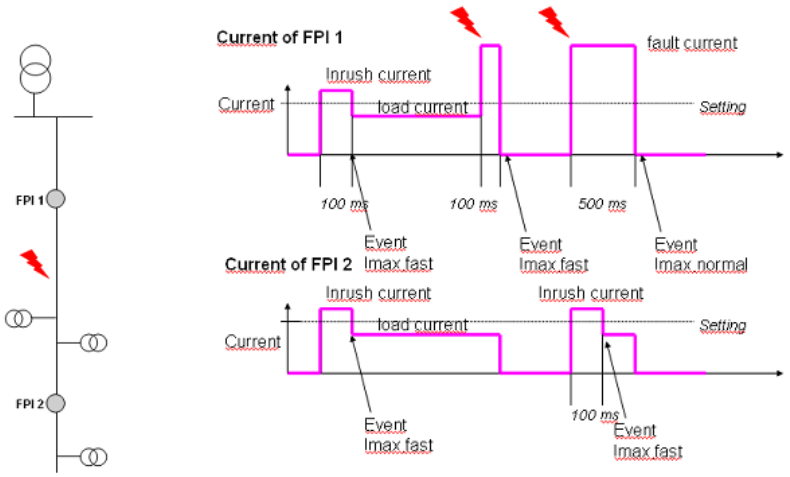
Figure 80: Alternative Configuration for Inrush

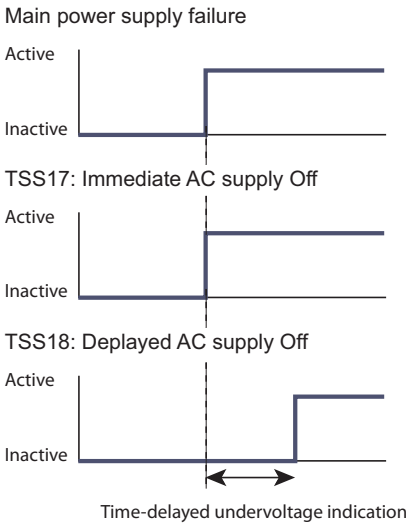


Configuration of Supply Voltage Monitoring

The T200 P unit activates an "Immediate AC supply Off" indication (TSS 17) as soon as the enclosure's mains supply voltage is absent.

Figure 81: Settings/Measurement and Fault Indicator Page

Figure 82: TSS17 Activated After Time Exceeded



Another "Delayed AC supply Off" indication (TSS18) is activated when TSS17 is activated for a time exceeding a configurable period (Figure 82).

TSS18 plays a role of power supply under voltage signal filtering. The purpose of this filtering is not to send too many successive alarms to the Supervisor whenever TSS17 changes state, following regular MV network malfunctions (e.g., during circuit-breaker reset cycles). In some cases it may be preferable to use the alarms on the TSS18 instead of the TSS17.

NOTE: The alarms can be generated only if the remote alarm function is active on the equipment.

Power supply failure time delay parameter:
Configurable from 0 to 21600 seconds

NOTE: The power supply malfunction signal is also used by the current fault detector in particular for the automatic control functionality.

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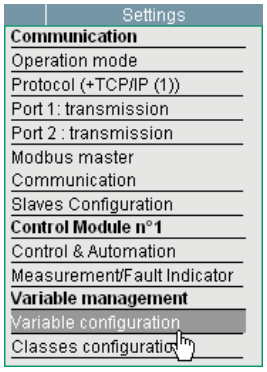
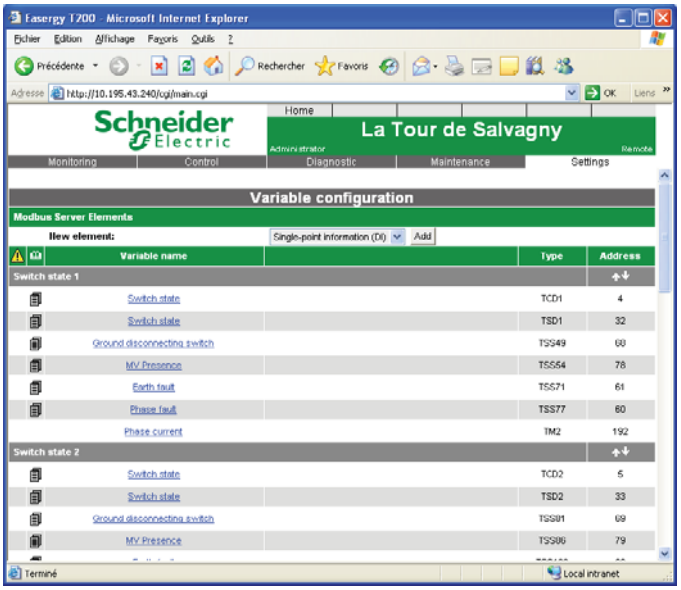
Customizing T200 P Unit Variables

Figure 83: Settings/Variable Configuration Page



Access: "***Settings/Variable configuration***" page (Figure 83).

Figure 84: Settings/Variable Configuration Page



Definition of Variables

Figure 85: Variable Configurations

Types of variables on T200 P unit

Example: Configuration with or without event and alarm saving

The standard T200 P unit is supplied with all of the variables necessary for operation of the equipment. This configuration takes into account all of the options installed on the equipment (the number of channels, type of modem, protocol, other options, etc.). The user can modify this configuration to adapt it to their needs, to add options or to modify the operation of certain functions (e.g., fault detector thresholds, alarms, communication parameters, etc.).

The T200 P Web server provides access to all of the variables defined by default on the T200 P unit. The level of access to a variable (visible in read-only mode, accessible in write mode, not visible) depends on how the variables have been configured. The parameters for this page can be viewed and/or modified depending on the user profile. With the factory settings, only an administrator can change the level of access to a variable.

To view the list of variables configured on the equipment, open the "*Settings/Variable configuration*" page. The variables present in this page are grouped by classes. In each class, a number of variables of several different types are found ("type" column).

NOTE: In the standard version it is not possible to add extra variables to those already created as standard. However, when the "local Modbus network" option is present in the equipment, it is possible to add variables corresponding to this option (see "local Modbus network" User Manual for more information).

Table 13: Variable Types

Type	Use	Description
TCD	Double telecommand	Allows control of the switch associated with a channel or enabling/disabling of automatic control. This type of variable is always associated with a TSD.
TSD	Double signalization	Indication of the state of the switch or automatic control (open, closed or undefined).
TSS	Single signalization	Indication of binary state (presence, absence) of certain information managed by the T200 P unit (DI, current faults, etc.).
TM	Telemeasurement	Analog measurements performed by the T200 P unit (current, voltage, etc.).
CNT	Counters	Operation or energy counter.

Variable addresses

All of the variables can be configured with an external address. This external address allows the variable to be made accessible in read or write mode from the Supervisor by means of the protocol used for transmission. A variable which has no address configured (address = "-") will not be accessible from the Supervisor. The values of the addresses configured depend on the type of protocol used.

NOTE: Refer to the user manual for the protocol installed on the T200 P unit for more information concerning the addressing tables related to this protocol.

Saving variables

T200 P unit included a number of logs allowing archiving of events of various types (event log, alarm log, measurement log). The logs can be accessed by the user via the embedded Web server ("*Diagnostic*" page). All of the variables can be configured separately with or without being saved as a measurement (if it is a measurement), event or alarm in these logs.

NOTE: The system log, for its part, does not take into account variable changes of state but rather information concerning the internal operation of the equipment.

When a variable is configured to be saved in a log, a specific symbol appears in the *Variable configuration* page on the same line as the variable:


Saving to alarm log


Saving to event log or to measurement log (if it is a measurement)

Events Associated with Variables

An event is generated by the T200 P unit when a change of state occurs on a variable. The T200 P unit manages two types of event tables associated with these changes of state:

- The local event table: This is the event log that can be viewed locally on the T200 P unit. The changes of state concerning variables can be recordable in this log or not, the aim being to have a history of changes of variables. For the recording of a change of state on a variable to be effective, the variable must have been defined by configuration as an event ("event" (TM) or "activate recording" (TSS, TSD) box checked in the variable configuration page).
- The protocol event table: This is an event stack for protocol communications. This stack will be read by the Supervisor during communications between the T200 P unit and the Supervisor. Contrary to local events, it is not possible to configure a variable with or without saving in the protocol event stack. This is because any change of state on a variable automatically generates saving in this protocol event stack (except for TMs for which one can choose to configure event saving in the stack or not).

Since protocol events are not configurable, the rest of this section will address only of configuration of the events associated with the local logs.

For each type of variable, it is possible to choose how to process the variable for its associated saving (with alarm or not, criterion for saving in an internal log). Table 86 summarizes how to save these events for each type of variable. This table is valid for each type of internal log (except the system log).

Figure 86: Saving Events for Each Variable

Event	TSS	TSD	TM	CNT	Comments
Change of state	yes	yes	no	no	Saving upon detecting any change of state of the variable
Upon loss of closing	no	yes	no	no	Saving upon detecting the loss of position of the closed state (although without being open)
Regular saving	no	no	yes	yes	Saving of the variable's state at fixed periods of time
High threshold	no	no	yes	yes	Saving upon exceeding a high threshold
Low threshold	no	no	yes	no	Saving upon exceeding a low threshold
Dead band	no	no	yes	yes	Saving upon % variation of the variable
Active maximum	no	no	yes	no	Saving of the maximum value reached over a given period
Active minimum	no	no	yes	no	Saving of the minimum value reached over a given period

NOTE: Configuration available in the *Settings*/*Variable configuration* page and then by clicking on the name of a variable.

Figure 87: Events Configuration for a TM

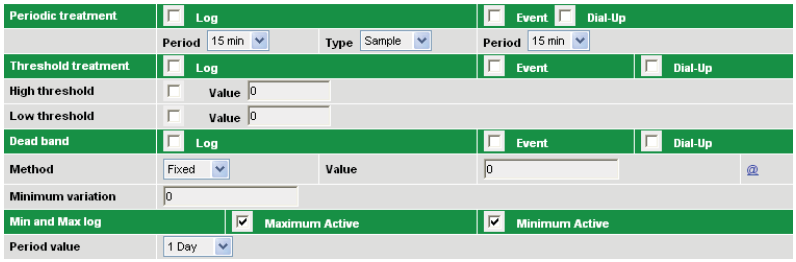
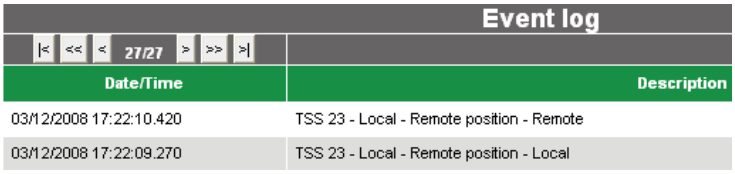


Figure 88: Saving in Internal Logs



In the local logs, events are registered with a brief descriptive text corresponding to the change of state of the variable and a date and time of occurrence saved by the T200 P unit for locating them in time.

Alarm Reporting / Alarm Acknowledgement

Use an alarm for events which must be indicated rapidly to the Supervisor, i.e., without waiting for interrogation by the Supervisor (e.g., if the interrogation frequencies of the SCADA system are rather spaced out over time).

The alarms are valid only for non-permanent type transmission (e.g., PSTN, GSM, Radio), i.e., for types of transmission that require a deliberate interrogation action by the Supervisor.

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On a permanent connection (RS232, RS485, OF, GPRS, LL), it is not necessary to use the remote alarm function because the retransmission of information between the T200 P unit and the Supervisor takes place fairly regularly or even continuously (e.g., polling).

NOTE: The "*Alarm configuration*" section is displayed in the configuration page for the variable only if the protocol is configured as Master/Master and if at least one of the communication ports is of the non-permanent type.

Figure 89: Alarms Configuration

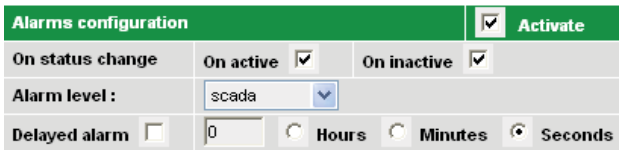
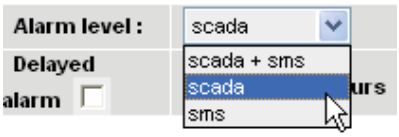


Figure 90: Alarm Levels (PSTN or GSM)



Alarm levels in PSTN or GSM

On a PSTN or GSM link, three configurable access levels associated with an alarm allow definition of the various ways of processing calls during retransmission of an alarm:

- "sms" level: retransmission of the alarm by SMS to an operator on standby duty.
- "scada" level: retransmission of the alarm by the protocol to the Supervisor.
- "scada + sms" level: retransmission of the alarm by the protocol and by SMS.

Call sequences triggering an alarm on a non-permanent link

On a non-permanent link, any change of state of a variable, if the latter has been configured to trigger an alarm, give rise to the sending of frames to the Supervisor to inform it of the change of state that has occurred. At the same time, the T200 P unit saves the change of state information in the alarm log.

In PSTN or GSM, the T200 P unit attempts to join the Supervisor three times on the main telephone number; if unsuccessful, the T200 P unit makes three further attempts on the backup telephone number. If the call still does not go through, the calls are stopped unless a new alarm occurs, which reinitiates the call sequence from the main number. The call sequences take into account the time delays configured in the "Protocol" page (refer to the specific protocol manual for more details).

In radio mode, the T200 P unit attempts to send a frame over the radio network to the Supervisor to retransmit the change of state information. If the call does not get through, the T200 P unit attempts to call the Supervisor indefinitely without any restriction regarding the number of attempts. The call sequences take into account the time delays configured in the "Protocol" page. It is recommended not to configure excessively short time delays so as not to mobilize the radio network constantly (refer to the specific protocol manual for more details).

In all cases, receipt of the event triggering an alarm by the SCADA system causes acknowledgement of the alarm. If the alarm information does not reach the Supervisor, no acknowledgement is performed.

The acknowledgement of alarms by the SCADA system can be checked in the "Alarm log" via the checked box opposite the alarm that has been acknowledged.

NOTE: This box is checked by the T200 P unit only for alarm retransmissions on non-permanent links. This is not managed for permanent links.

NOTE: The acknowledgement is internal to the T200 P unit and is the subject of no particular order from the Supervisor in the frame destined for the T200 P unit.

Double Command (TCD) Configuration

By clicking on the name of a TCD type variable in the *Settings / Variable configuration* page, one can obtain access to its settings, namely:

Figure 91: Configuration of a TCD

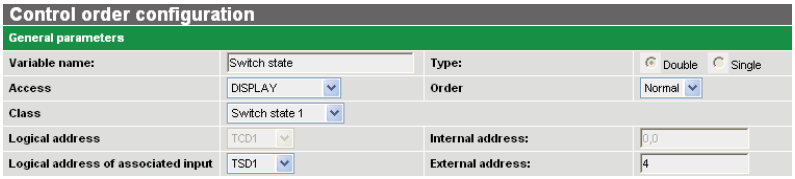


Table 14: General Parameters—TCD

Parameter	Description
Variable name	Customization of the variable name.
Type	Type of variable, double or single: "Double" by default for a TCD (unmodifiable).
Access	Defines the level of accessibility of this variable (administrator, operator, monitoring). The level of accessibility is defined with the login and password used for access to the Web server.
Orde	The SCADA order can be reversed depending on the hardware configuration of the digital outputs of the T200 P unit (active on low level or on high level).
Class	Allows a variable to be associated with a defined class. It is advisable to group together those variables having an information link in the same class so as to make reading in the pages of the Web server easier.
Logical address	Logical address assigned to this variable by the T200 P unit. This is in fact the logical name of the variable (TCD+No.) (unmodifiable).
Internal address	Internal address assigned to this variable by the T200 P unit. This is in fact a Modbus address for the internal bus link between the CONTROL module and the COM card (unmodifiable).
Logical address of associated input	A TCD is always associated with a TSD. The T200 P unit automatically assigns the TSD which is associated with this variable (should not be modified).
External address	Address providing access to this variable in read/write mode from the Supervisor via the protocol. The address is specific to each protocol used (Modbus, IEC, DNP3). The basic T200 P unit includes for each variable the configuration of the external addresses corresponding to the installed protocol. An address set to "–" is made inaccessible from the Supervisor.

NOTE: Refer to the manual for the protocol which is installed on the T200 P unit for details concerning the external address tables.

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Single Signalization (TSS) Configuration

Click the name of a TSS type variable in the *Settings* / *Variable configuration* page to access its settings.

Figure 92: Configuration of a TSS

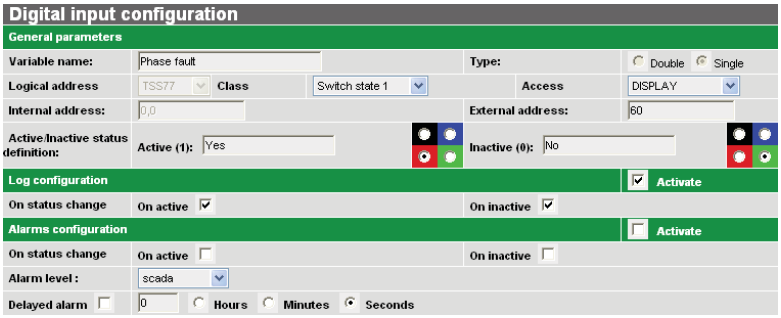

Table 15: General Parameters—TSS

Parameter	Description
Variable name	Customization of the variable name.
Type	Type of variable, double or single: "Single" by default for a TSS (unmodifiable).
Logical address	Logical address assigned to this variable automatically by the T200 P unit. This is in fact the logical name of the variable (TSS+No.) (unmodifiable).
Class	Allows a variable to be associated with a defined class. It is advisable to group together those variables having the same information link in the same class so as to make reading in the pages of the Web server easier.
Access	Defines the level of accessibility of this variable (administrator, operator, monitoring). The level of accessibility is defined with the login and password used for access to the Web server.
Internal address	Internal address assigned to this variable by the T200 P unit. This is in fact a Modbus address for the internal link between the CONTROL module and the COM card (unmodifiable).
External address	Address providing access to this variable in read/write mode from the Supervisor via the protocol. The address is specific to each protocol used (Modbus, IEC, DNP3). The basic T200 P unit includes for each variable the configuration of the external addresses corresponding to the installed protocol. An address set to "–" is made inaccessible from the Supervisor.
Active status definition	Allows definition of a text and a color to be displayed in the "Monitoring" and "Control" pages to represent the active state of the variable (binary value 1).
Inactive status definition	Allows definition of a text and a color to be displayed in the "Monitoring" and "Control" pages to represent the inactive state of the variable (binary value 0).

NOTE: Refer to the manual for the protocol which is installed on the T200 P unit for details concerning the external address tables.

Table 16: Record Configuration—Saving Changes of State in the Event Log

Parameter	Description
"Activate" check box	Check this box to activate saving of the variable in the event log according to the following configured criteria.
On active	Check this box to save a change of state in the active state of the variable in the event log.
On inactive	Check this box to save a change of state in the inactive state of the variable in the event log.

Alarm configuration

Concerns changes of state in the alarm log, but also:

- **In PSTN or GSM mode:** call sequence to the Supervisor then retransmission of the alarm corresponding to the change of state.
- **In radio mode:** sending of a frame to the Supervisor to retransmit the alarm corresponding to the change of state.

NOTE: Alarms are not used on permanent links. The following configuration should not be used for a permanent link:

Table 17: Alarm Configuration

Parameter	Description
"Activate" check box	Check this box to activate saving of the variable in the alarm log according to the following configured criteria.
On active	Check this box to save a change of state in the active state of the variable in the alarm log.
On inactive	Check this box to save a change of state in the inactive state of the variable in the alarm log.
Alarm level	Three configurable levels corresponding to the various possibilities for alarm retransmission to the Supervisor (see section on "*Alarm reporting / Alarm acknowledgement*"
"Time-delayed alarm" check box	Check this box if the alarm is to be retransmitted to the Supervisor only after a configurable time delay.
Time-delayed alarm	Choice of the unit (hour, minute, second) and the waiting time before retransmission of the alarm.

TSS test

The "TSS test" button at the bottom of the TSS configuration page allows the TSS to simulate being active for a few seconds (10 seconds). That makes it possible to perform testing of state retransmission to the Supervisor, without actually generating the change of state for this TSS.

Double Telesignal (TSD) Configuration

Click the name of a TSD type variable in the *Settings / Variable configuration* page to access its settings.

NOTE: The configuration is practically identical to that of a TSS. We noted in this section merely the differences between a TSD and a TSS:

Table 18: Difference in Configuration Between a TSD and a TSS

General Parameters

Parameter	Description
Type	Type of variable, double or single: "Double" by default for a TSD (unmodifiable).
Other status	Allows definition of a text and a color to be displayed in the "Monitoring" and "Control" pages to represent the undefined state of the variable.

Record Configuration

Parameter	Description
On status change	Check this box to save any change of state of the variable in the event log.
On leaving close	Check this box to save the loss of the switch closed state (loss of the active state of the variable) in the event log.

Alarm Configuration

Parameter	Description
On status change	Check this box to save any change of state of the variable in the alarm log.
On leaving close	Check this box to save the loss of the switch closed state (loss of the active state of the variable) in the alarm log.

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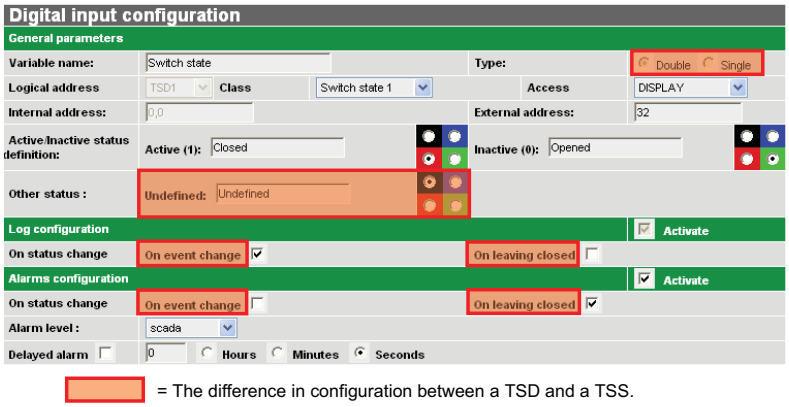
Figure 93: Digital Input Configuration Page



= The difference in configuration between a TSD and a TSS.

Telemeasurement (TM) Configuration

Click the name of a TM type variable in the *Settings / Variable configuration* page to access its settings.

Figure 94: TM Configuration

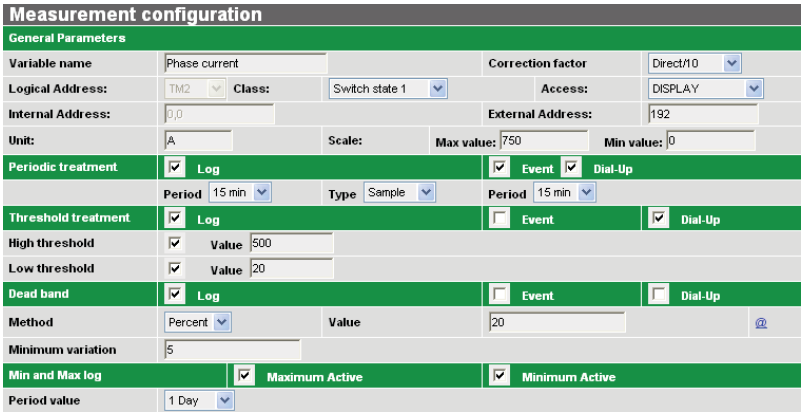


Figure 95: Miscellaneous Page

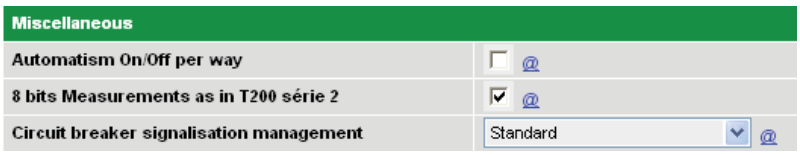


Table 19: Periodic Treatment

Parameter	Description
"Log" check box	Check this box to activate saving the measurement in the measurement log according to the criteria configured in Period description below.
Period	Can be used to choose the period for saving of the measurement in the measurement log.
Type	Can be used to choose how to save the measurement: • *Averaged* mean of measurements over the configured period • *Sampled* instantaneous measurement at each configured period
"Event" check box	Check this box to activate saving the measurement in the protocol event stack according to the period criteria configured in Period description below. [1, 2]
Period	Can be used to choose the period for saving of the measurement in the protocol stack and/or the alarm log.
"Dial up" check box	Check this box to activate saving of the measurement in the alarm log and sending of a frame to the Supervisor according to the period criterion configured in Period description above.

1 The measurements cannot be saved in the internal event log.

2 The Modbus protocol of the T200 P unit does not enable measurements to be saved in the protocol event stack. It is not necessary to check the "Events" box for this protocol.

NOTE: The alarms are not used on permanent links. The "Call" check box should not be used for a permanent link.

The solution for retransmitting the measurements in Modbus protocol is:

- On a permanent link: They will be read during the next interrogations coming from the Supervisor.
- On a non-permanent link: Check the "Call" box to retransmit it immediately (or after the configured period), or wait for the next interrogation by the Supervisor.

Table 20: Threshold Treatment

Parameter	Description [1, 2]
"Log" check box	Check this box to activate saving of the measurement in the measurement log according to the criteria configured below.
High threshold	Check the box to activate saving of the measurement upon exceeding the high threshold.
High threshold value	Configure the high threshold value which will cause processing of the defined records.
Low threshold	Check the box to activate saving of the measurement upon exceeding the low threshold.
Low threshold value	Configure the low threshold value which will cause processing of the defined records.
"Dial up" check box	Check this box to activate saving of the measurement in the alarm log and sending of a frame to the Supervisor according to the threshold criteria configured above.

1 The measurements cannot be saved in the internal event log.

2 The Modbus protocol of the T200 P unit does not enable measurements to be saved in the protocol event stack. It is not necessary to check the "Events" box for this protocol.

NOTE: The alarms are not used on permanent links. The "Call" check box should not be used for a permanent link.

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Table 21: Dead Band

Parameter	Description
"Log" check box	Check this box to activate saving of the measurement in the measurement log according to the % criterion configured below.
Method	*Fixed:* A fixed change in the value of the variable results in an associated processing operation (saving, alarm). *Percentage:* A change in percentage of the variable results in an associated processing operation.
Value	Configure the minimum variation percentage or the minimum fixed value of measurement variation which will cause processing of the defined records.
Minimum change	Whatever the method (fixed or percentage), a minimum change in the value of the TM is necessary for the variable to be processed (event, alarm, etc.). [1]
"Event" check box	Check this box to activate saving of the measurement in the protocol event stack according to the % criterion configured above. [2, 3]
"Dial up" check box	Check this box to activate saving of the measurement in the alarm log and sending of a frame to the Supervisor according to the % criterion configured above.

1 On software V2.xx, the "Method" and "Minimum change" parameters are not available. Processing is performed on a percentage and without a minimum change.

2 The measurements cannot be saved in the internal event log.

3 The Modbus protocol of the T200 P unit does not enable measurements to be saved in the protocol event stack. It is therefore no use checking the "Events" box for this protocol.

NOTE: The alarms are not used on permanent links. The "Call" check box should not be used for a permanent link.

Table 22: Minimum and Maximum Recording

Parameter	Description
"Max. active" check box	Check this box to activate saving in the measurement log of the maximum value reached in the period value configured below.
"Min. active" check box	Check this box to activate saving in the measurement log of the minimum value reached in the period value configured below.
Period value	Can be used to configure the period for saving of the measurement in the measurement log.

Counter (CNT) Configuration

Click the name of a CNT type variable in the *Configuration / Variable configuration* page to access its settings.

Figure 96: CNT Configuration

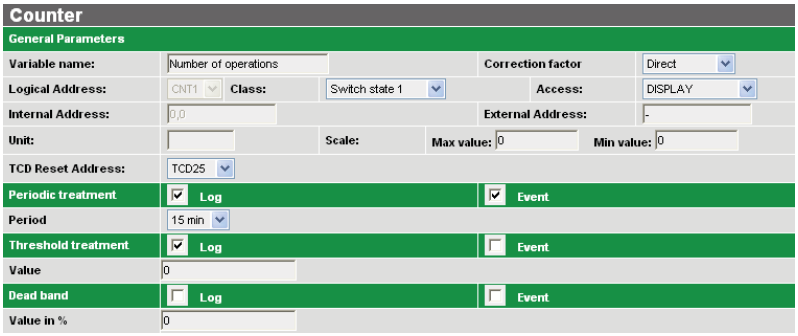


Table 23: CNT Configuration

General Parameters	
Parameter	**Description**
Variable name	Customization of the variable name.
Correction factor	Allows definition of a correction factor for display of the measurement in the *Monitoring* page. **NOTE:** This factor does not change the format of the counter sent in the protocol frame (default factor: “Direct”).
Logical address	Logical address assigned to this variable by the T200 P unit. This is the logical name of the variable (CNT+No.) (unmodifiable).
Class	Allows a variable to be associated with a defined class. It is advisable to group variables together that have an information link in the same class in order to make reading in the pages of the Web server easier.
Access	Defines the level of accessibility of this variable (administrator, operator, monitoring). The level of accessibility is defined with the login and password used for access to the Web server.
Internal address	Internal address assigned to this variable by the T200 P unit. This is in fact a Modbus address for the internal link between the CONTROL module and the COM card (unmodifiable).
External address [1]	Address providing access to this variable in read/write mode from the Supervisor via the protocol. The address is specific to each protocol used (Modbus, IEC, DNP3). The standard T200 P unit includes for each variable the configuration of the external addresses corresponding to the installed protocol. An address set to "–" is made inaccessible from the Supervisor.
Unit	Unit to be associated with measurement for display in "*Monitoring*" page (default: with no unit).
Maximum scale value	Should correspond to the maximum value that can be taken in practice by the counter value. For "Raw" or "Normalized" type measurements, this Max. value is used for scaling of the display in the Monitoring page only. [2] **NOTE:** The value configured influences the precision of the counter.
Minimum scale value	Should correspond to the minimum value that can be taken in practice by the counter value. For "Raw" or "Normalized" type measurements, this Min. value is used for scaling of the display in the Monitoring page only. [2] **NOTE:** The value configured influences the precision of the counter.
TCD reset address	Address of the remote internal command to define the “Preset” value for the counter.

1 Refer to the manual for the protocol which is installed on the T200 P unit for details concerning the external address tables.

2 The T200 P unit manages measurement display in the "Monitoring" page according to two formats:
Direct (or adjusted) value: corresponds to the real value in the reference unit (does not take into account the configured "Min. and Max. scale" values).
Raw (or normalized) value: corresponds to a value calculated and scaled in accordance with a formula taking into account the configured "Min. and Max. scale" values. (See the protocol User Manual for details concerning the calculation).
The choice of "Normalized" or "Adjusted" configuration is generally made in the "Protocol" page.
It should be noted that, unlike the measurements, the Min. and Max. values configured for the counters do not affect counter sending in the protocol frames to the Supervisor.

Table 24: Internal Counting

Parameter	Description
Type of object	Selection of the variable type on which the counter is incremented (Digital or Analog)
Object	Name of the variable to which the counter is assigned
Counting method	Depending on the type of object, the methods displayed are as follows: • For a DI type variable: *Pulse counter:* The counter is incremented at each switchover of the variable to high state. *Time counter:* The T200 P unit calculates the period during which the variable is in the high or low state. The display in the monitoring page is in the form "day, hour, minute, second." Integrating meter: Over a given range of time (integration period), the T200 P unit calculates the number of high states of the variable. For example, the integrating meter makes it possible to obtain power values from a power meter with pulse output. • For an AI/AO type variable: Integrating meter: The meter is incremented each second by the current value of the defined analog variable. For example, the T200 P unit can poll power type analog variables on the Modbus Master port; the meter can then obtain the energy from the power calculation. *Mean counter:* The counter analyses an analog variable and displays the mean value of the variable over the configured integration period. This function allows smoothing of analog variables in particular.
Pulse width	Pulse length (in ms) after which the T200 P unit will consider a state as high.
Inhibition after reset	Period during which the T200 P unit inhibits pulse detection after zero crossing by the variable. This filter makes it possible to avoid possible rebounds in the event of a return to zero.
Integration period	Useful period of the measurement in the case of an integrating meter (DI type variable) or mean (AI type variable)
Conversion factor	Used in the case of a pulse counter; weight of the pulse sent. With each pulse sent, the counter value increments in accordance with the conversion factor.
Active state	Field used only in the case of a time counter. State of the variable (high or low) which activates the time counter.

Table 25: Routine Processing

Parameter	Description
"Recording" check box	Check this box to activate saving of the counter in the measurement log according to the criterion configured below.
"Event" check box	Check this box to activate saving of the counter in the protocol event stack according to the period criterion configured below. [1, 2]
Period	Can be used to choose the period for saving of the counter in the measurement log and in the protocol stack to the Supervisor.

1 The counters cannot be saved in the internal event log.

2 The Modbus protocol of the T200 P unit does not enable counters to be saved in the protocol event stack. It is therefore no use checking the "Events" box for this protocol. The solution for retransmitting the counters in Modbus protocol on a permanent link: they will be read during the next interrogations coming from the Supervisor.

Table 26: Processing on Threshold

Parameter	Description
"Recording" check box	Check this box to activate saving of the counter in the measurement log according to the value criterion configured below.
"Event" check box	Check this box to activate saving of the counter in the protocol event stack according to the criterion configured below. [1, 2]
Value	Configure the minimum value which will cause processing of the records defined above.

1 The counters cannot be saved in the internal event log.

2 The Modbus protocol of the T200 P unit does not enable counters to be saved in the protocol event stack. It is therefore no use checking the "Events" box for this protocol. The solution for retransmitting the counters in Modbus protocol on a permanent link: they will be read during the next interrogations coming from the Supervisor.

Table 27: Dead Band

Parameter	Description
"Recording" check box	Check this box to activate saving of the counter in the measurement log according to the % criterion configured below.
"Event" check box	Check this box to activate saving of the counter in the protocol event stack according to the criterion configured below. [1, 2]
Value as %	Configure the minimum counter variation percentage which will cause processing of the records defined above.

1 The counters cannot be saved in the internal event log.

2 The Modbus protocol of the T200 P unit does not enable counters to be saved in the protocol event stack. It is therefore no use checking the "Events" box for this protocol. The solution for retransmitting the counters in Modbus protocol on a permanent link: they will be read during the next interrogations coming from the Supervisor.

Summary of Records in Logs and Stacks

Table 28 summarizes the possibilities for recording in the various logs and in the protocol event stack according to each type of variable:

Table 28: Summary of Records in Logs and Stacks

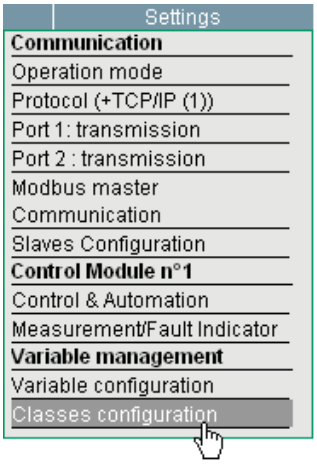
Variable Type	Log			Protocol Event Stack
	Event	Alarm	Measurement	
TSS	If corresponding check box checked			Always
TSD				
TM		If "Dial up" check box checked	If "Log" check box checked	If "Event" check box checked [1]
CNT				If "Log" check box checked

1 For a TM or a CNT, several measurement processing operations can be performed according to the type of transmission:
Event box only checked: Saving of the TM or CNT in the protocol stack without call sequence to the Supervisor (general case of the permanent link, except in Modbus protocol).
Event + Dial up boxes checked: Saving of the TM in the protocol stack and call to the Supervisor (general case of the non-permanent link). Not applicable with CNT.
Dial up box only checked: Call to the Supervisor without saving of the TM in the protocol stack (specific case of the non-permanent link in Modbus protocol). Not applicable with CNT.

Customizing T200 P Classes

Access: "***Settings/Classes configuration***" page (Figure 97).

Figure 97: Settings/Classes Configuration Page



Definition of Classes

A class allows the T200 P variables to be grouped in various categories in the monitoring and control pages of the Web server (e.g., "Monitoring" and "Control" pages), so as to make the data display clearer.

NOTE: The variable configuration page also adopts the same organization of variables by class.

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Classes Configuration

Figure 98: Class Configuration Page

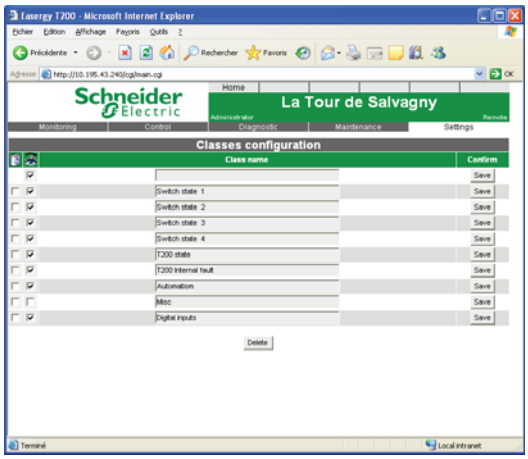

Figure 99: Class Creation

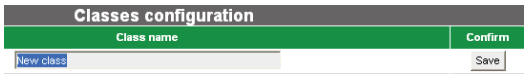

Figure 100: Class Deletion

The factory configuration settings of the T200 P unit include by default a number of classes. However, it is possible to modify this configuration to customize the display of the variables in the pages.

The *"Settings/Classes configuration"* page can be used to create a new class, or to modify or delete an existing class. See Figure 98.

Creating a class

Enter the class name in the empty "Class name" field and click the "Save" button (Figure 99).

Once the class has been created, it is then possible to configure a variable of the T200 P unit to be attached to that class (see “Customizing T200 P Unit Variables” on page 69).

Modifying a class

Modification concerns only the change of class name or the possibility of making a class visible or invisible in the pages of the Web server.

To modify the name of a class, change the title in the class entry field and click the "Save" button.

A specific check box can be used to define whether a class and the variables associated with that class will be visible in the monitoring pages ("Monitoring" and "Control" pages).

Selection of this check box and clicking the "Save" button makes the class visible in the pages (and conversely for deselection).

Deleting a class

A specific check box in the page can be used to delete an existing class.

Selecting the check box and clicking the "Delete" button permanently erases the selected class (Figure 100).

NOTE: Classes cannot be erased if variables are still attached to that class. Refer to Figure 101.

Figure 101: Variables Associated to a Class—Monitoring Page

Label		Status
Switch state 1		
Switch state		Closed
Status		No
DI aux		No
Earth fault		No
MV Presence		Yes
Phase fault		No
Number of operations		27

Tests at Commissioning

During the tests, a microcomputer designed for configuration of the T200 P unit can remain connected to the Communication module. It can be used to monitor the status of the equipment, time-stamped events, and communications sent over the internal Modbus link. Commissioning sheet NT00004 can be used.

“Local/Remote” switch set to “Local”

- Check that the PC has taken the “local equipment” information into account.
- Check that the MV cubicle switchgear is operating correctly, for example that each channel opens and closes and that the positions of the switches correspond to the status of the indicator lamps.
- Check “locked” information (ground switch):
  Check that the equipment has taken the “locked” inputs into account.

NOTE: See “Operation” on page 85, for a more detailed description of the Easergy T200 P operation.

“Local/Remote” switch set to “Remote”

- Check that the switch status is correctly displayed on the control station.
- Check that the switch connecting cables are correctly marked and disconnect them—a remote alarm is generated after a one-minute time-out.
- Check that the HA10 switch connectors are fitted with polarizing pins. If dummy devices are used, install them on the HA10 connectors to ensure that neither the battery nor the MV cubicle is overloaded.
- Telecontrol order check:
  - — Check that each order processed by the remote control station is correctly transmitted and executed by the equipment, for example that each channel opens and closes.
  - — Check that the switch position information received at the remote control station corresponds to the status of the indicator lamps.
- “Digital inputs” check:
- Check that the equipment has taken the “Digital inputs” into account and that the indications have been forwarded to the remote control station.
- Check the internal event current detection function:
  The “Test” pushbutton on the Control module activates the indications corresponding to those channels for which the Current Measurement option is installed.

  NOTE: A current simulator supplied as an optional extra can be used for this check. It performs a complete test of the acquisition system. Disconnect the dummy devices and reconnect the switch connecting cables to their HA10 connector (polarization).
- Telecontrol order check:
  - — Check that each order processed by the remote control station is correctly transmitted and executed by the equipment, for example that each channel opens and closes.
  - — Check that the switch position information received at the remote control station corresponds to the status of the indicator lamps.
- Check “locked” information (ground switch):
  Verify that the equipment has taken the “Locked” inputs into account and that the notifications have been forwarded to the remote control station.

- "AC supply Off" alarm check:
  Open the AC supply fuse block. The remote alarm is generated immediately, or after the configured time-out.
- Measurement checking:
  Check that the equipment takes into account the measurements performed (currents, voltages, frequency, power, etc.) according to the options installed on the T200 P unit and retransmits them to the remote control station.

NOTE: See "Operation" on page 85, for a step-by-step description of the various transmission stages indicated by the indicator lamps on the front panel of the Communication module.

NOTE: These tests store time-stamped events. Remember to erase them from the configuration PC.

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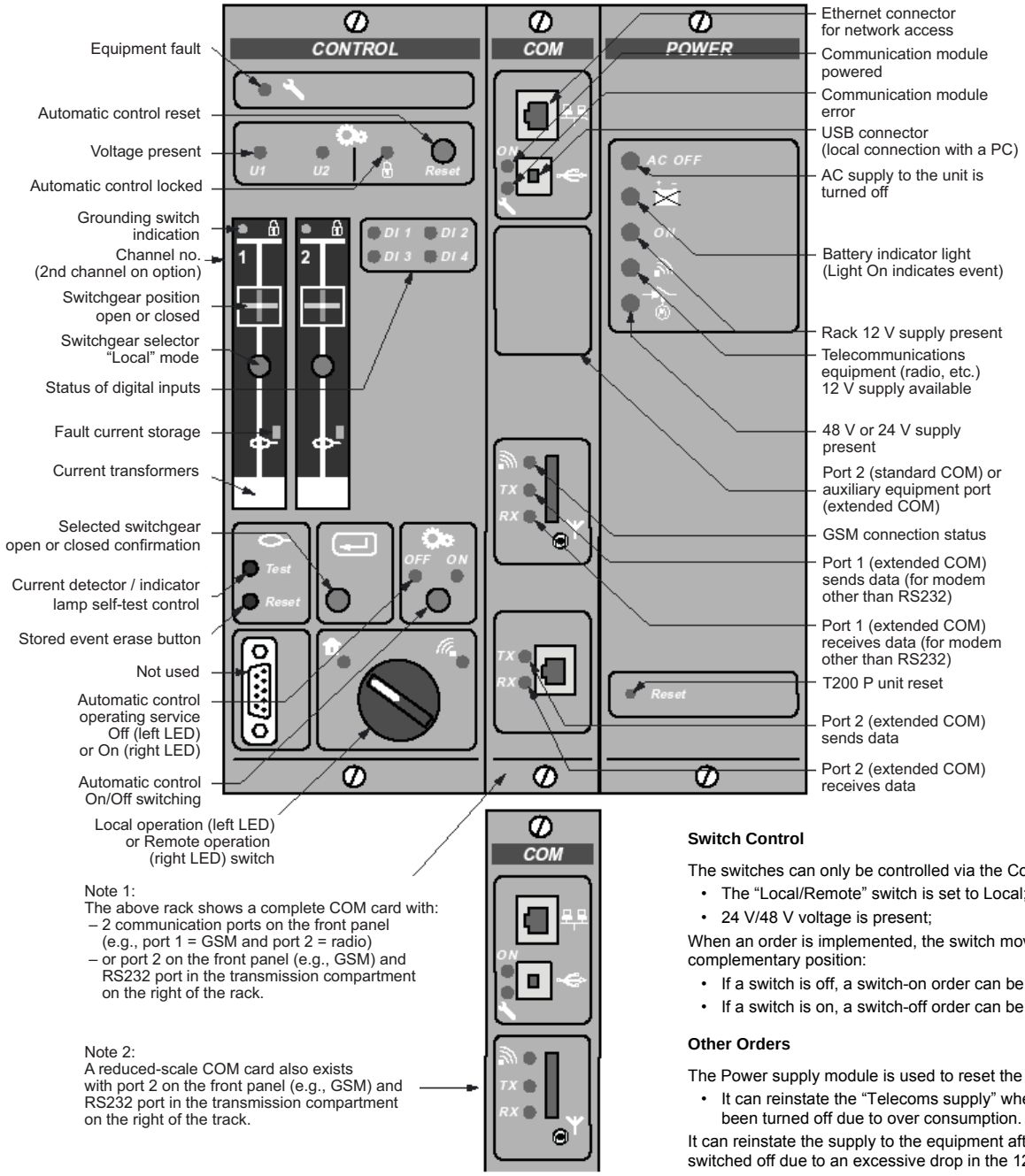
Operation

Operating Mode

The T200 P unit can be used locally via the Control module or remotely from a remote control station, depending on the position of the Local/Remote switch. An indicator lamp showing the status of the equipment is located at the top of the control panel (front panel of the Control module). A PC can be connected to the COM module to provide further information about the status of the T200 P unit and its operating history.

Figure 102: T200 P Control Module Description



Note 1:
The above rack shows a complete COM card with:
– 2 communication ports on the front panel (e.g., port 1 = GSM and port 2 = radio)
– or port 2 on the front panel (e.g., GSM) and RS232 port in the transmission compartment on the right of the rack.

Note 2:
A reduced-scale COM card also exists with port 2 on the front panel (e.g., GSM) and RS232 port in the transmission compartment on the right of the track.

Switch Control

The switches can only be controlled via the Control module if:

- The "Local/Remote" switch is set to Local;
- 24 V/48 V voltage is present;

When an order is implemented, the switch moves to the complementary position:

- If a switch is off, a switch-on order can be given.
- If a switch is on, a switch-off order can be given.

Other Orders

The Power supply module is used to reset the power supply:

- It can reinstate the "Telecoms supply" when this output has been turned off due to over consumption.

It can reinstate the supply to the equipment after it has been switched off due to an excessive drop in the 12 V supply.

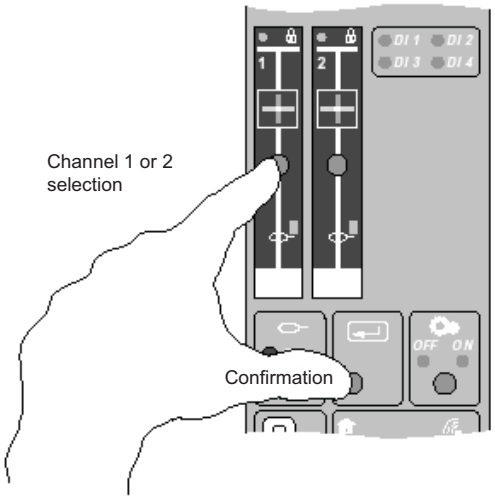
ENGLISH

Testing Indicator Lamps and Event Detection

On the Control module, a stored event current is shown by a red indicator lamp included in each channel block diagram.

- A "Test" pushbutton is used to trigger simultaneous testing of all of the control panel indicator lamps and at the same time testing of event detection acquisition systems.
- So long as the "Test" button is held down, all of the CONTROL panel indicator lamps remain lit. This allows indicator lamp operation to be checked.
- When the "Test" button is released, all of the indicators go out except the channel indicator lamps which remain lit for 3 seconds. A lit indicator lamp indicates that event detection is functioning on the channel (simulation of phase-to-phase and phase-to-ground current faults with levels of 750 A).
- The "Reset" pushbutton is used to erase stored events.

Figure 103: Controlling Order



To ensure that a switch cannot be open or closed accidentally, and that no open/close operations are performed at the wrong time, a manual operation can only be implemented locally **if** the pushbutton corresponding to the channel to be controlled **and** the confirmation pushbutton are pressed simultaneously.

⚠ DANGER

UNINTENDED OPERATION

Do not push the channel control button and the confirmation button at the same time. This will cause the switch to open or close.

Failure to follow these instructions will result in death or serious injury.

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Maintenance

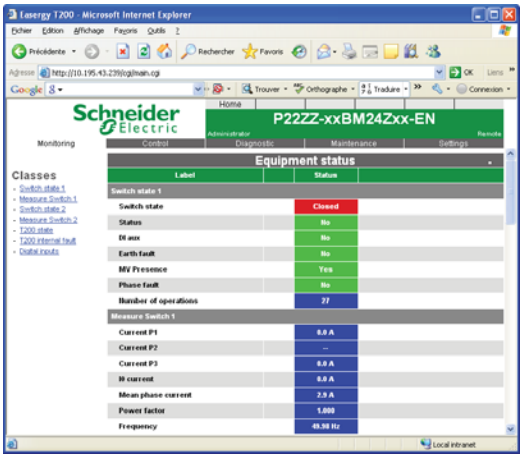
General

The equipment does not require regular maintenance. The integrated battery test keeps users informed of the battery availability status. Conduct an interior and exterior visual inspection annually to determine if the environment or bugs are affecting the components.

NOTE: Replacement fuses are provided in the "accessories" bag attached inside the basic enclosure.

The T200 P unit has tools to perform system maintenance. This requires a PC-compatible microcomputer with Internet Explorer® (or an equivalent software) installed. It is possible to read the internal states of the equipment and the events stored in memory by the T200 P unit (see Commissioning).

Figure 104: Monitoring Page



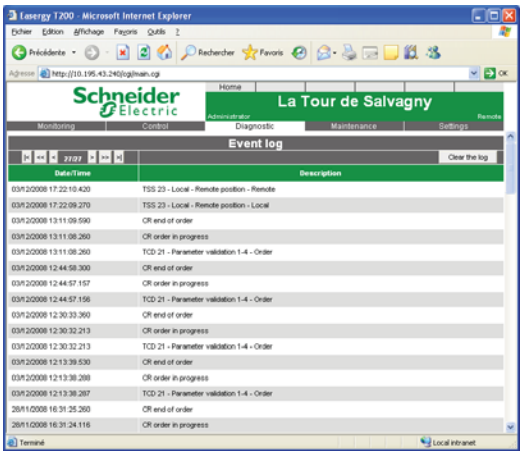
Monitoring page

Figure 104 shows an example of a 1-channel Easergy T200 P unit, with internal fault detector option, provided with a current acquisition card and a transformer for voltage measurement. This menu allows viewing of all of the states and information managed by the T200 P unit:

- The switch state: "Open", "Closed", or "Locked";
- Stored events: "I Max." and "I Max. transient" on each phase;
- Current measurement on each phase, average current, and neutral current;
- Voltage measurement, phase-to-ground, and phase-to-phase;
- Power measurement, active, reactive, and apparent;
- Frequency and power factor measurement;
- Operation and energy counter values;
- The automatic control status, On or Off;
- The operating mode: local or remote;
- AC supply Off, Delayed AC supply Off;
- The state of digital inputs 1 to 8;
- The state of digital outputs 1 to 4.

NOTE: The indications are refreshed every second.

Figure 105: Event Log



Consulting the logs

The various logs available (events, alarms, and system) make it possible to know the history of everything that has occurred on the T200 P unit. This information can be saved to analyze events and help determine the cause and origin of each event.

- All of the events displayed in the logs are time stamped in order to know the date of origin of an event.
- Given the large number of time-stamped events saved, it is possible to go back sufficiently far in time to trace the cause of repeating events. When the maximum number is exceeded, the oldest event on the list is erased by the most recent one.
- The logs can be saved on a PC as Microsoft® Excel® compatible files in order to review and analyze events and/or statistics later.
- The logs can be transferred by e-mail so as to be able to forward the report on a problem to an accessory department or person or possibly to exchange an opinion with the manufacturer of the T200 P unit.

Indicator lamps

The T200 P unit has indicator lamps on the front panel of the rack modules (see “Operation” on page 85). These indicator lamps provide information concerning the operating state of the T200 P unit and concerning the presence of any detected fault.

NOTE: A diagnostic through the state of the indicator lamps on the front panel is not always adequate to find the cause of an event. A lit indicator lamp indicates that an event has occurred, but it is often necessary to consult the logs or the "Monitoring" page to determine precisely the cause of the event.

For more information, refer to the Diagnostics Table on page 89.

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Diagnostics via the Front Panel Indicator Lamps and Logs

Table 29: Diagnostics

Symptoms	Possible Causes	Solutions	Log [1]
The “Equipment fault” LED on the Control module is lit. (you are advised to connect a PC to the Control module to determine the cause of the fault: “Equipment states” menu)	Easergy T200: no communication between the Control module and the Communication module	Replace the Control module and/or the Communication module	Modbus communication fault
	The battery charger output voltage is too high or too low	Check the charger and the battery. If necessary, replace the Power Supply module and/or the battery	Charger fault
	No power supply to the switchgear	See “48 V LED extinguished” in the symptom column below	Motorization power supply malfunction
	Loss of battery capacity or charge fault	See "Battery fault LED lit" in the symptom column below	Battery fault
	No telecommunications power supply (Radio or Modem)	See “external 12 V LED extinguished” in the symptom column below	Accessory equipment power supply malfunction
	Problem on the Control module	Connect the PC to the COM module and consult the logs. **Configuration loss: Reconfigure the T200.** **Other faults**: perform resetting on the power supply card. If the fault persists, replace the CPU card.	Configuration loss or memory fault or program error or parameter error
	The Control module software is faulty	Press the key Reset on the Power Supply module. If the LED does not go out after a few seconds, replace the CPU card.	—
The "AC supply Off" LED on the front panel of the Power Supply module is lit AC Off	AC supply fuse blown	Replace the gF type 2 A HRC fuse, 10x38 mm, in the lower enclosure panel.	Power supply malfunction
	The output connector of the mains fuse holder is disconnected	Put the connector back in place on the power supply card.	Power supply malfunction
	No supply to the enclosure	Connect the AC supply.	—
	Enclosure power supply turned off automatically due to prolonged AC supply outage	Check the cause of the AC supply outage. If the AC supply remains Off, run another supply cycle by pressing the Reset button on the Power Supply module. If the power supply does not restart, change the Power Supply module and/or the battery.	—
	Temporary AC supply outage	Wait for the AC supply voltage to be reinstated (the enclosure is now running on battery)	Power supply malfunction
The "Battery fault" LED on the front panel of the Power Supply module is lit	Loss of battery capacity or charge fault	Check that the AC supply is On and that the charger is supplying 12 V. To do this, disconnect the battery and measure the voltage on the rack battery connector. If the voltage is null, replace the Power Supply module. Otherwise, after reconnecting the battery, reset the Power Supply module to trigger a battery test; if the problem recurs after charging for 24 hours, replace the battery.	Battery fault
The "Rack 12 V" LED on the front panel of the Power Supply module is extinguished	Fuse blown	Replace the 5x20 mm, 0.8 A semi time-lag fuse on the Power supply module.	—
	If the “AC supply Off” LED is lit, the enclosure supply has been turned off automatically due to a long AC supply outage	Check the cause of the AC supply outage. If the AC supply remains Off, run another supply cycle by pressing the Reset button on the Power Supply module. If the power supply does not restart, change the Power Supply module and/or the battery.	—
	Enclosure power supply turned off automatically due to a drop in the 12 V voltage	Check the charger and the battery. If necessary, replace the Power Supply module and/or the battery.	—
	Power Supply module malfunction	Replace the Power Supply module.	—
The "external 12 V" LED on the front panel of the Power Supply module is extinguished	Fuse blown	Replace the 5x20 mm, 0.4 A semi time-lag fuse on the Power Supply module.	Accessory equipment power supply malfunction
	Current at the output > 1.3 A ± 0.3 A for 3 min	Check the transmission equipment and reinstate the supply by pressing the Reset button on the Power supply module.	
	If the “AC supply Off” LED is lit, the enclosure supply has been turned off automatically due to a long AC supply outage	Check the cause of the AC supply outage. If the AC supply remains Off, run another supply cycle by pressing the Reset button on the Power Supply module. If the power supply does not restart, change the Power Supply module and/or the battery.	—
	Enclosure power supply turned off automatically due to a drop in the 12 V voltage	Check the charger and the battery. If necessary, replace the Power Supply module and/or the battery.	—
	Power Supply module malfunction	Replace the Power Supply module.	Accessory equipment power supply malfunction

Continued on next page

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Table 29: Diagnostics *(continued)*

Symptoms	Possible Causes	Solutions	Log [1]
The "48 V" LED on the front panel of the Power Supply module is extinguished	Fuse blown	Replace the 5x20 mm, 5 A time-lag fuse on the CPU card of the Control module in the left-hand part of the enclosure.	Motorization power supply malfunction
	If the “AC supply Off” LED is lit, the enclosure supply has been turned off automatically due to a long AC supply outage	Check the cause of the AC supply outage. If the AC supply remains Off, run another supply cycle by pressing the Reset button on the Power Supply module. If the power supply does not restart, change the Power Supply module and/or the battery.	—
	Motorization power supply turned off automatically due to a drop in the 48 V voltage	Check the charger and the battery. If necessary, replace the Power Supply module and/or the battery.	—
	Power supply turned off following overheating of the power supply card charger (e.g., excessive power consumption on the motorization 48 V)	Following the 48 V turn off, if the temperature of the charger drops in less than one minute, the 48 V power supply returns automatically. On the other hand, if the temperature does not drop 1 minute after the 48 V turn off, a manual reset should be performed on the power supply card to restore the 48 V power supply (thermal protection requiring action). If the problem persists, replace the power supply card.	Motorization power supply malfunction
	T200 P CPU card malfunction	Replace the T200 P CPU card.	Motorization power supply malfunction
	Power Supply module malfunction	Replace the Power Supply module.	
All of the Control module indicator lamps are extinguished	The equipment is not powered up	Power up the equipment.	—
	Supply fuse blown	Replace the 5x20 mm, 0.8 A semi time-lag fuse on the Power supply module.	—
	Control module malfunction	Replace the Control module.	—
	The card program is no longer running	Reset by pressing the Reset button on the Power Supply module.	—
The Communication module "On" LED is extinguished	The equipment is not powered up	Power up the equipment.	—
	Supply fuse blown	Replace the 5x20 mm, 0.8 semi time-lag fuse on the Power supply module.	—
The Communication module "Fault" LED is lit	Configuration problem on one of the COM or CONTROL modules or internal connection fault between the modules	Connect the PC to the COM module. Refer to the system log to determine the error. Check the conformity of configuration of the COM and/or CONTROL modules of the T200 P (example of fault: incompatibility of the configured modem with that installed on the COM card or internal connection problem between one of the CONTROL modules and the COM module). If the fault persists, replace the module.	Interface or modem initialization error (x) / Control Module error (x)
The Communication module "Fault" LED flashes rapidly	The Communication module software is faulty, or starting with USB cable connected.	Stop the USB driver, disconnect the USB cable from the Communication module, then press the Reset key on the Power Supply module. If the LED does not go out after a few seconds, replace the Communication module.	RESET
The Communication module "Fault" LED flashes slowly	The Communication module software is faulty	With the USB cable disconnected and the USB driver stopped, press the Reset key on the Power Supply module. If the LED does not go out after a few seconds, replace the Communication module.	—

Other Diagnostics

Event	Possible Causes	Solutions
Operation orders not executed	The switch order was not executed	Check: • the position of the “Local/Remote” switch; • the validity of the order issued; • the connection between Easergy T200 P and the switches.
Loss of T200 P configuration	Device reset performed immediately after a change in the device's configuration	It is recommended to wait for about fifteen seconds before resetting the device following a change in configuration parameters of the T200. Use the "Off Line Configurator" generation tool provided in appendix (on the Easergy CD) to create a configuration file (text file) according to the options used on the T200 P unit. Then load this file on the T200 P unit via the "Maintenance / Save-Restore" menu of the embedded Web server.
Error during software loading	The loading process manages only the file format with .zip extension. The software must therefore not be unzipped before loading it on the T200 P unit. (file with .mem extension not managed)	Start the loading operation again without unzipping the software

1 The events can be consulted in one or more of the various available logs: Event log, Alarm log, or System log.
In these logs, the information appears in the form "TSSxx – Information (log column) – Fault."

Power Supplies

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This unit must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this unit before working on or inside the unit.
- Always use a properly rated voltage sensing device to confirm that the power is off.
- Replace all devices, doors, and covers before turning on power to this unit.

Failure to follow these instructions will result in death or serious injury.

Powering down the equipment

1. Switch off the AC supply outside the equipment or on the fuse block within the enclosure.
2. Disconnect the supply to the battery circuit.
3. Unplug the battery connector under the rack.
4. Use a properly rated voltage testing device to verify that all power if off.

All of the LEDs on the front panels of the rack should now be extinguished. The Easergy T200 P enclosure is now powered down.

Battery replacement and installation

- Replacing the battery
  - — Before working on the battery, disconnect it from the equipment by unplugging the connector from the base under the rack.
  - — Remove the battery by sliding it outwards, raise the terminal covers and remove the two terminal nuts, then disconnect the Faston lugs from the connecting cord.
- To install a new battery, repeat this sequence in the reverse order.

Current transformer safety precautions

The current transformer connectors are IP2X. There is no particular risk to disconnect toroid temporary (< 10 mn).

Shorting is required if switching off the current transformer is not temporary (> 10 minutes). No particular danger in shorting the CT with appropriate shorting plug. The voltage incurred between open terminals is limited below 1000 Vac.

⚠ DANGER

HAZARDOUS VOLTAGE

Do not open circuit the current transformers.

Failure to follow these instructions will result in death or serious injury.

ENGLISH

NOTICE

There is no need to alter the cables when connecting the current transformer and power supply cables to the cubicle. The cables must never be modified.

Failure to follow these instructions can result in equipment damage.

Servicing and storing the batteries

Sealed lead batteries are used. The advantages of this type of battery include the fact that there is no risk of explosion, no acid leakage and no servicing requirement. However, this type of battery has its limitations:

- Limited number of recharging cycles;
- Average service life of 10 years, with aging accelerated by temperatures outside the recommended range;
- Aging during storage (do not store for more than 6 months without recharging, as this type of battery does not withstand a total discharge);
- Difficult to predict the end of battery service life.
  The Power Supply module is designed to optimize the characteristics of the battery. A battery fault alarm informs the remote control system of an imminent discharge.

NOTE:

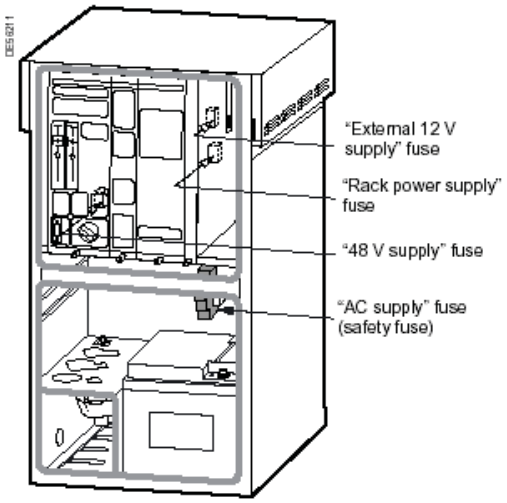
- Use batteries having recent production dates (less than 3 months old).
- Do not store batteries longer than 6 months without recharging them.
- Do not throw the batteries away.

Replacing fuses

Replacement fuses are provided in the "accessories" bag attached inside the enclosure.

- AC supply fuse
  This fuse is located in the lower panel of the enclosure.
  gG type HRC fuse of rating 2 A, 10 x 38 mm.
- Rack power supply fuse
  The fuse protecting the power supply to all of the electronic modules is located on the Power Supply module card.
  Fuse: 5 x 20 mm, 0.8 A semi-time-lag.
- External 12 V supply fuse
  The fuse is located on the Power Supply card.
  Fuse: 5 x 20 mm, 4 A time-lag.
- 48 V supply fuse
  The fuse is located on the CPU card of the Control module. This card is located in the left-hand part of the rack. It is accessible after removing the control panel (front of the Control module).
  Fuse: 5 x 20 mm, 5 A time-lag.

Figure 106: Fuse Locations



ENGLISH

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This unit must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this unit before working on or inside the unit.
- Always use a properly rated voltage sensing device to confirm that the power is off.
- Replace all devices, doors, and covers before turning on power to this unit.

Failure to follow these instructions will result in death or serious injury.

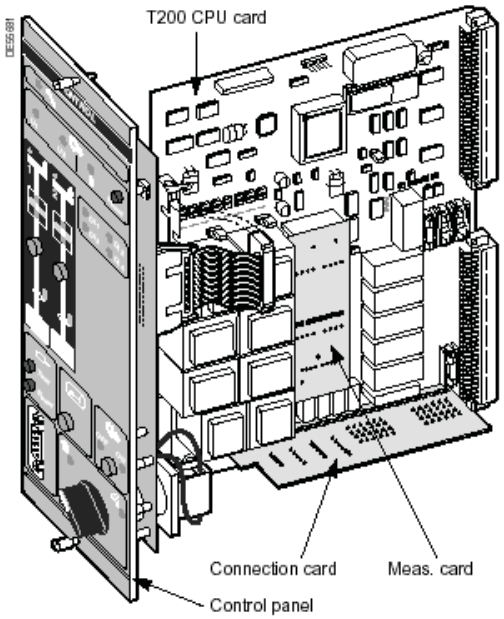
To replace the fuses:

1. Turn off all power to the enclosure.
2. Use a properly rated voltage sensing device to verify the power is off.
3. Disconnect the battery.
4. Replace the fuse.
5. Reconnect the battery.
6. Turn the power on to the enclosure.

If the T200 P unit does not work properly, turn the power off and call your local sales representative for assistance.

Card Replacement

Figure 107: Card Locations



Replacing the Power Supply module

1. Turn off all power to the enclosure.
2. Use a properly rated voltage sensing device to verify the power is off.
3. Remove the control panel from the unit.
4. Disconnect the battery and 120 Vac external power supply connectors on the underside of the card.
5. Release the two locking screws on the power supply module and remove it from its slot.
6. Insert the new module, locking it in position.
7. Reconnect the battery and 120 Vac external power supply connectors to the underside of the card.
8. Reinstall the control panel to the unit.
9. Turn on the 120 Vac power to the enclosure.

If the T200 P unit does not work properly, turn the power off and call your local sales representative for assistance.

Replacing the Communication module

1. Turn off all power to the enclosure.
2. Use a properly rated voltage sensing device to verify the power is off.
3. Release the two locking screws and remove the Communication module from its slot.
4. Insert the new module and lock it in position.
5. Turn the power on to the enclosure.

If the T200 P unit does not work properly, turn the power off and call your local sales representative for assistance.

NOTE: Remember to configure the module; see Commissioning.

Replacing the T200 P CPU Card or adding/replacing the Voltage Measurement Card

1. Turn off all power to the enclosure.
2. Use a properly rated voltage sensing device to verify the power is off.
3. Release the two locking screws on the front panel of the Control module.
4. Disconnect the ribbon cable from the rear of the front panel by separating the two levers on each side of the connector base.
5. If necessary, remove the T200 P CPU card from its slot after loosening its locking screw (at the bottom left-hand, on the front of the card) and disconnecting all of the connectors from the Connection card (under the rack).
6. Push the new T200 P CPU card firmly in place and tighten its locking screw (at the bottom left-hand, on the front of the card).
7. Reconnect all of the connectors to the Connection card (under the rack).
8. Attach the end of the 26-pin ribbon cable from the control panel to the connector on the T200 P CPU card.
9. Screw the control panel into position.
10. Turn the power on to the enclosure.

If the T200 P unit does not work properly, turn the power off and call your local sales representative for assistance.

Installing the voltage measurement card

1. Turn off all power to the enclosure.
2. Use a properly rated voltage sensing device to verify the power is off.

1. Plug the measurement card into the T200 P CPU card and secure it with the screw.
2. Install the T200 P CPU card and the control panel (see above).
3. Turn the power on to the enclosure.

If the T200 P unit does not work properly, turn the power off and call your local sales representative for assistance.

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Appendix A—Configurable Parameters

Use the key below to identify configuration options in Table 30–Table 35.

Pattern	Definition
	Accessible or modifiable as User, Operator, or Administrator.
	Accessible or modifiable only as Operator or Administrator.
	Accessible or modifiable only as Administrator.
	No access (read-only) or non-existent.

Table 30: Configuration Options—Home Page

Sub-page	Section	Parameter / Button	Configuration Range	Comments
		Home		Back to home page.
		Local/remote	Local/remote	Local: normal access. Remote: simplified access (images and logos not loaded).
	Choice of language	Language	Français/ English/Português/Espagnõl/ Deutsch	
	User	User name	No restriction	Confirmation by OK. Default: Easergy.
		Password	No restriction	Confirmation by OK.. An incorrect user name or password opens a “User” session. Default: Easergy.

Table 31: Configuration Options—Monitoring Page

Sub-page	Section	Parameter / Button	Configuration Range	Comments
	Classes	Channel x		Access to the corresponding class states.
		Channel x measurements		
		T200 P information		
		T200 P internal faults		
		Digital inputs		

Table 32: Configuration Options—Control Page

Sub-page	Section	Parameter / Button	Configuration Range	Comments
	Channel x	Operation preset		Allows the operation counter value to be changed.
	Channel x	F–O control		Allows the switch status to be changed.
	Channel x measurements	Active energy preset		Allows the active energy counter value to be changed.
	Channel x measurements	Reactive energy preset		Allows the reactive energy counter value to be changed.
	T200 P information	On/Off control		Allows the automatic control status to be changed.
	Digital inputs	F–O control		Allows the state of the digital outputs to be changed.

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Table 33: Configuration Options—Diagnostic Page

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Alarm log		Clear log		The "Ack" box is checked when the SCADA system has acknowledged the alarm. The "Clear log" button clears the log's content.
Event log				The "Clear log" button clears the log's content.
System log				The "Clear log" button clears the log's content.
Measurement log				The "Clear log" button clears the log's content.
File transfer		Alarms.csv		Transfers the alarms log in Excel file form. "Save" saves the file to the PC. "Open" opens the file under Excel.
		Events.csv		Same as for the events log.
		System.csv		Same as for the system log.
		Measures.csv		Same as for the measurements log.

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Table 34: Configuration Options—Maintenance Page

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Terminal	General	Name of terminal	No restriction	User's choice.
		Date format	DD/MM/YYYY MM/DD/YYYY YYYY/MM/DD	Defines the date format to be displayed in the logs.
		Date/time of last configuration		Unmodifiable
		Configurator structure version		Unmodifiable
	Control module x	Application		Manufacturer information, unmodifiable.
		Date/time of last configuration		Manufacturer information, unmodifiable.
		Application version		
		Measurement processor version		
		Hardware configuration		
		Save		Takes into account the change.
Software	Software information	All displayed parameters		Name of software, version, date and time of compilation, type of compression, size, CRC32. Unmodifiable
		Software 1	Checked or not	Selection of software 1.
		Software 2	Checked or not	Selection of software 2.
		Download software		Allows the T200 P software to be updated.
Clock	Terminal date/time	Date	Consistent date format (year > 2000)	
		Time	Consistent time format	
		Update		Allows the T200 P date and time to be updated manually
		Synchronization		Allows the T200 P date and time to be updated automatically by the PC.
	SNTP service	SNTP server	Consistent IP address	IP address of the main SNTP server. **Note**: When the address is set to "0.0.0.0", the function of synchronization by this SNTP server is deactivated.
		Auxiliary SNTP server	Consistent IP address	Same as for the auxiliary SNTP server.
		Polling period	1–300 s	As standard: 1 s. Allows the time synchronization period to be defined via the SNTP server. Configurable from 1–120 s.
		Number of reconnection attempts	0–9	As standard: 3. Upon malfunction of synchronization with the server, max. number of attempts to be made.
		Last SNTP synchronization	Date and Time	Indication of the time and date of the last SNTP synchronization performed (unmodifiable).
		SNTP server gateway	Consistent IP address	Address of the gateway for access to the main SNTP server.
		Auxiliary SNTP server gateway	Consistent IP address	Address of the gateway for access to the auxiliary SNTP server.
		Max. server response time	1–60 s	As standard: 2 s. Maximum time waiting for the reply from the SNTP server before making a further attempt at synchronization.
		Clock validity period	1–1440 min.	As standard: 35 min. Time after which the T200 P must be resynchronized with the SNTP server.
		Update		Allows the T200 P date and time to be updated manually.
		Synchronization		Allows the T200 P date and time to be updated automatically by the PC.

Continued on next page

ENGLISH

Table 34: Configuration Options—Maintenance Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
IP parameters	Ethernet interface	Mac address		Unique identification address for each T200 P, set in factory. Unmodifiable.
		DHCP	Active Inactive	Defines whether the server of the Ethernet local area network can allocate automatically on connection an IP address to the T200 P (active) or not (inactive).
		IP address	Consistent IP address	Ethernet IP address of the T200 P. Default: 172.16.0.5
		Sub-network mask	Consistent mask	The mask enables (0) or inhibits (255) the choice of accessible IP address values. Default: 255.255.255.0
		Gateway addresses	Consistent IP address	IP address of the server's Ethernet gateway. The gateway centralizes all of the network IP accesses. Default: 172.16.0.1
		Primary DNS server	Consistent IP address	IP address of the primary DNS server (Domain Name Server). The DNS enables the IP addresses to be associated with the website names. Default: 172.16.0.1
		Secondary DNS server	Consistent IP address	IP address of the secondary DNS server (Domain Name Server). Backup DNS server. Default: 0.0.0.0
	Virtual interface 1 and 2	IP address	Consistent IP address	Virtual Ethernet IP address 1 and 2 of the T200 P (as standard: 0.0.0.0).
		Sub-network mask	Consistent mask	The mask enables (0) or inhibits (255) the choice of usable IP address values (as standard: 255.255.255.0).
		Gateway addresses	Consistent IP address	IP address of the server's virtual Ethernet gateway. Operation identical to the Ethernet Interface part.
	USB interface	Server IP address		IP address allocated to the T200's embedded Web server for USB access. Unmodifiable. Default: 212.1.1.10
		Client IP address		IP address allocated to the PC connected via USB to the embedded Web server. Unmodifiable. Default: 212.1.1.11
	Communication interface	Server IP address		IP address allocated to the T200's embedded Web server by the GPRS network operator. Unmodifiable.
		Client IP address		IP address allocated by the GPRS network operator to the client (Supervisor) which will log on to the T200 P Web server. Unmodifiable.
		Save / Cancel		Allows changes to be saved/cancelled.
IP server port	TCP services	HTTP server port	Valid port number	Port number for the HTTP server of the T200. Default: 80 Any change of port No. implies indication with the IP address (e.g., 10.207.154.240:1500 for access with a port No. = 1500).
		Telnet server port	Valid port number	Port number for the Telnet server of the T200. Default: 23
		Port 1 server port	Valid port number	Port number for the port 1 trace server of the T200. Default: 1168
		Port 2 server port	Valid port number	Port number for the port 2 trace server of the T200. Default: 1169
		TCP/IP port trace server port	Valid port number	Port number for the TCP/IP port trace server of the T200. (default: 1170
		Save		Allows changes to be saved.
User		User name	No restriction	User name for the session.
		Password	No restriction	Password for the session.
		Type	Administrator Operator	The Administrator has full access. The Operator has restricted access.
		Save		Saves changes.
		Recycle bin		Check box to select a session to be deleted.
		Delete		Deletes an existing session if the corresponding box is checked.
Port traces 1 and 2 and TCP/IP	Trace options	Start / Stop		Start/Stop frame motion PC – T200.
		Erase		Erases the content of the trace.
Backup / Restore	Saves the terminal configuration	T200 P → PC arrow		Allows the configuration to be saved on the PC in file form.
	Loads the terminal configuration	PC → T200 P arrow		Enables the configuration to be loaded on the PC from a file.

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Table 34: Configuration Options—Maintenance Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Operating modes General communication parameters	Communication parameters on physical ports	Port 1 or 2 mode	Depends on the protocol: - IEC: Unbalanced or balanced mode - DNP3: Unsolicited response or No unsolicited response - Modbus: Report by exception or No report by exception	Definition of transmission mode to be used: - Without alarms: "Unbalanced" or "Master/Slave" or "No report by exception" or "Unsolicited response." - With alarms: "Balanced" or "Master/Master" or "Report by exception."
		Port 1 link	Not used	- Channel not available.
			Normal	- Main transmission channel. Two "normal" channels of different characteristics can be used if there are two control PCs (main and maintenance). The T200 P cannot manage simultaneous TCDs coming from the two systems.
			Balanced – Normal/Backup	- Two channels are necessary in this mode. The operation of the channels is balanced. In the event of a fault on the channel in service, switchover to the other channel takes place automatically.
			Main – Normal/Backup	- Requires another channel as "Backup – Normal/Backup." Same operation as "Balanced" but with the priority use of this channel.
			Backup – Normal/Backup	- Requires another channel as "Main – Normal/Backup." Same operation as "Balanced" but with use of this channel if malfunction of the Main channel.
			Store and Forward	- Function used in radio mode. In addition to the normal channel function of transmission to the SCADA system, this channel is also used for relaying to an auxiliary T200 P located within transmission range and not accessible by any other means.
			Test	- (in radio mode only). Allows a fixed frequency to be generated on the radio network for antenna installation adjustment operations or level measurements on fields received on another T200 P within range of the first.
		Port 2 link	Same as Port 1	Same as Port 1
		Port 1 medium	Direct RS232 (internal) Radio (external) 600/1200 FSK radio (internal) 600/1200 FSK LL (internal) PSTN (external) 1200/2400 FFSK (internal) PSTN (internal) GSM (external) GSM (internal) GPRS (internal)	- RS232 modem integral with COM card - For external radio with integral modem - FSK radio modem on COM card - FSK radio modem on COM card - For external PSTN modem accessible by Hayes command - FFSK radio modem on COM card - Internal PSTN modem on COM card - For external GSM modem accessible by Hayes command - Internal GSM modem on COM card - Internal GPRS modem on COM card
		Port 2 medium	Same as Port 1	Same as Port 1
	Communication parameters on TCP/IP ports	TCP/IP port link	Not used Normal	- Channel not available. - Channel used for transmission to the Supervisor via the Ethernet interface on condition that the protocol supports this transmission mode.
		Save		Allows the configuration to be taken into account.

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Table 35: Configuration Options—Settings Page

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Protocol				Refer to the User Manual for the protocol used for more information.
TCP/IP protocol				Refer to the User Manual for the protocol used for more information.
Port 1 or 2 Transmission	Direct RS232 or RS485 or Radio or PSTN or GSM line or LL	Baud rate	200–38400 baud	Frame transmission rate (600, 1200 bds only with FSK radio, 1200 with LL, 1200 or 2400 bds with FFSK radio).
		Parity	None or Space or Even or Odd	Transmission parity.
		Stop bits	1 or 2	Stop bit in frame.
		Frame error on noisy outgoing cable	Yes or no	The start of the frame can be filtered or not to avoid reading any noise.
		Frame error on line at rest	Yes or no	Any holes in the frame can be filtered or not.
		Delay before response	0–10000 ms	In 10 ms increments. Upon reception, wait before sending the response to avoid frame overlapping. Default: 0 ms.
		DTR management:	Checked or not	Data Terminal Ready. DTR is used by the T200 P to indicate that it is ready for transmission.
		DTR - RTS delay:	0–10000 ms	In 10 ms increments. Time delay to be complied with between rising of the DTR and RTS signals. In external radio, this corresponds to the time delay between the send order and carrier rise. Default: 0 ms.
		RTS management	Checked or not	Request To Send. If this option is selected, the RTS signal will be managed during transmission exchanges with the modem.
		CTS management	Checked or not	Clear To Send. The modem enables the CTS as soon as ready after RTS enabling by the T200.
		RTS to CTS delay	10–10000 ms	In 10 ms increments. Time delay between receiving the RTS and sending the CTS by the modem. Default: 20 ms.
		RTS (or CTS) to message delay:	0–1000 ms	In increments of 10 ms. Time delay between rise of RTS (or CTS if managed) and sending the message.
		Message to RTS delay	0–10000 ms	In 10 ms increments. Time delay between the end of the message and RTS falling by the T200 P. Default: 20 ms.
		DTR management	Checked or not	Data Terminal Ready. The modem causes the DTR to rise after powering up or when it is Clear To Send.
		CD management	Checked or not	Carrier Detect. The carrier can be used by the modem to detect reception of a message.
	LL	Type of line	2-wire or 4-wire	Choice of type of leased line used.
	PSTN or GSM	Calling party call delay	1–600 s	Allows the call to be released when the T200 P is called after the configured time delay. Default: 30 s.
		Called party call delay	1–600 s	Allows the call to be released when the SCADA system is called after the configured time delay. Default: 60 s.
		Telephone No. (normal)	0–9, P, T or space	Main telephone No. to be used in case of alarm retransmission.
		Telephone No. (backup)	0–9, P, T or space	Backup telephone No. to be used in case of alarm retransmission if main No. cannot be reached.
		Modem init. sequence	No restriction. Record consistent AT commands	AT commands necessary to initialize the PSTN modem. With internal PSTN mode, default AT commands not modifiable. Default: &F0%S0=12S0=1&K0%C0E0&W0&Y0
	PSTN	Type of dialing	Pulse or voice frequency	Type of dialing used for alarm retransmission.
	GSM	PIN code	0000–9999	PIN code of the GSM card.
		SMS service center No.	0–9, P, T or space	Telephone No. of the SMS service center (gateway for SMS's).
		User SMS No.	0–9, P, T or space	Telephone No. of the user for sending SMS's.

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Table 35: Configuration Options—Settings Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Port 1 or 2 Transmission (continued)	RS485	Polarization	Checked or not checked	Activates polarization of the T200 P end line. The RS485 line should be polarized at one termination only, generally on the Master side.
		End-of-line resistance	Checked or not checked	Active the T200 P end load resistance. The RS485 line should be loaded at both its terminations.
		Type of line	2-wire or 4-wire	Choice of type of transmission used: 2-wire or 4-wire.
	GPRS	Access Point Name (APN)	No restriction.	Name of GPRS access point provided by the GPRS network operator.
		PIN Number	0000–9999	PIN code of the GSM card.
		Daily disconnect	Checked or not checked	Override setting of automatic disconnection/reconnection of the T200 P to the GPRS network at a fixed time. In the event of loss of connection with the network, this process allows the T200 P to reconnect, because it cannot do so by itself autonomously.
		Disconnection hour:	0–23	Configuration of the selected daily disconnection time according to the criteria described in "*Daily disconnection*."
		PPP session timeout	1–60 min	Configuration of the delay maximum before disconnection of T200 P from GPRS network, in case of no data transfer detected by the T200.
		Specific Ping IP adress	Consistent IP address, e.g., 192.168.2.169	The ping makes it possible to verify and measure the quality of the equipment's connection with another device connected to the Ethernet network. Enter the known IP address of another device capable of receiving the packet corresponding to the ping allowing this quality to be measured.
		Ping test		Button that can be used to set the ping test manually to verify T200 P connection to the GPRS network. The T200 P then displays the result of the test: "*Ping OK*" or "*Ping failed*."
		Ping time interval	1–360 min	Delay between two successive automatic “Test ping.”
		Ping attemps	0–10	Number of maximum attempts for the “Test ping” process in case of no response from remote IP address.
		Ping Timeout	1–360 s	Maximum delay to wait for the response during the “Test ping” to define “Ping error.”
		Authentication	Checked or not checked	When the GPRS network requires authentication in the connection phase, activate this function by checking the box. Encryption protocols accepted: PAP, CHAP, MSCHAP, MSCHAP V2.
		Login	No restriction	Configuration of the login used for authentication. Configure this field only if the "*Authentication*" option has been checked.
		Password	No restriction	Configuration of the password used for authentication. Configure this field only if the "*Authentication*" option has been checked.
		Save		Allows the configuration to be taken into account.
Control./ Autom. Automatic control No. x	Controls	Type of control	Standard PM6 CI2 Other	- Standard = Separate CO/CF controls - PM6 = Single CO/CF control on CO - CI2 = Control execution time at 100 ms - Other = Specific cubicle connection (e.g., RL27)
		Time delay pending position return	1000–30000 ms	In 100 ms increments. Waiting time for change of switch position following an order, before sending a telecontrol fault. Default: 15000 ms.
		Non-complementarity filtering time delay	1000–30000 ms	In 100 ms increments. Waiting time for non-complementarity following a loss of switch state before sending a position fault. Default: 10000 ms.
		Execution time delay (except PM6)	50–15000 ms	In 50 ms increments. Switch motorization control relay rise time. Not used with a PM6. Default: 2200 ms.

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Table 35: Configuration Options—Settings Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Control./ Autom. Automatic control No. x (continued)	Miscellaneous	BVE control (DOUT 1)	Checked or not checked	When this option is selected, digital output DOUT 1 is activated to cause flashing of an external fault indicator lamp, whenever the T200's internal fault detector detects and indicates the presence of a phase or ground fault.
		FPI test (DOUT 2)	Checked or not checked	When this option is selected, digital output DOUT 2 is activated whenever a current exceeds the phase or ground event detection threshold configured on the T200, then goes low as soon as the fault returns below the threshold.
		Double power supply management (DOUT 3)	Checked or not checked	When this option is selected, digital output DOUT 3 is used for the double mains power supply management option if the latter is installed in the enclosure.
		T200 P without COM card	Checked or not checked	This option should be used when the T200 P includes no COM card in the equipment.
		SF6 lack copying (channel 1 on DI3, channel2 on DI4)	Checked or not checked	To be compatible with old versions of T200P (Series 1&2), the information "SF6 lack" (connected on Harting switch connector - pin 9) is internally associated to DI3 (channel 1) or to DI 4 (channel 2). So, when the "SF6 lack" is detected, the DI3 (or DI4) is activated at the same time. Note : If this option is checked, the DI 3 and DI 4 are not any more available as digital inputs because they are already defined as “SF6 lack.”
		8-bit measurements	Checked or not checked	By checking this option, the T200 P measurements are made compatible with the old-generation T200s coded on 8 bits (instead of 16 bits).
		Circuit breaker signalization management	Several choices: - Standard - Ground switch management by TSD - Free TSS - Specific mode 1	Choice of mode of acquisition of the position coming from the switch: - Standard (factory settings). A single TSS used in this "*Locked switch*" mode (pin 7 of the 10-pin Harting connector). The presence of this TSS inhibits execution of orders on the switch. - Ground switch management by TSD: An additional input (pin 8) allows the ground switch to be managed as a TSD and not as a TSS. - Free TSS: Pins 7 and 8 normally assigned to "Switch locked" and "MV voltage present" can be used freely and used as mere DIs - Specific mode 1: similar to the "Ground switch management by TSD″ mode, with in addition the inhibition of orders when the T200 P is in "Local" mode.
		Position reading of sector circuit breaker	Checked or not checked	Option only available when the AC supply protection is made by circuit breaker instead of fuse holder. When this option is used, the T200 P manage DI 5 to indicate when circuit breaker protection is open.
		U measurements by capacitor divisor other than RL27	Checked or not checked	Case of voltage measurement done by capacitor divisor (RL27 type) but without using the calibration process done by RL27.
	Automation Channel x	Type of automation	None Voltage Time Sectionalizer Changeover switch	- No automatic control - Opening on voltage dip without event detection - Opening on voltage dip due to fault detected - Power supply source changeover depending on the source available
	Sectionalizer automatic control	Fault counter reset time delay	20000–240000 ms	In 5000 ms increments Maximum waiting time to detect the number of faults configured before automatic control reset. Default: 30000 ms.
		No. of faults authorized	1–4	Number of faults to be taken into account before opening upon automatic control action
	ATS[1/2] Network	Changeover delay time	100–200000 ms	In 100 ms increments. Waiting time before changeover action if the conditions are required. Default: 1000 ms.
		Time before normal channel return	5000–60000 ms	In 1000 ms increments. Waiting time before switchover to normal channel upon channel voltage return. Default: 10000 ms.

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Table 35: Configuration Options—Settings Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Control./ Autom. Automatic control No. x (continued)	ATS[1/2] Network (continued)	Operating mode	SW1→SW2 SW2→SW1 SW1↔ SW2 Auto SW1 Auto SW2	Choice of changeover mode: - Switchover only from SW1 to SW2 - Switchover only from SW2 to SW1 - Switchover from SW1 to SW2 or vice versa - Ditto with priority return to SW1 if available - Ditto with priority return to SW2 if available
	Voltage Time automatic control	Voltage malfunction timeout	0–32700 ms	In 100 ms increments. Waiting time following voltage disappearance before opening the channel (default: 200 ms)
		Closing timeout	0–32700 ms	In 100 ms increments. Waiting time following voltage return before reclosing the channel. Default: 200 ms.
		Monitoring timeout	0–32700 ms	In 100 ms increments. Time for monitoring non-disappearance of the voltage following voltage return. If this is the case during the timeout, the channel opens and automatic control is blocked. Default: 200 ms.
		Save		Allows the configuration to be taken into account.
Measurements/ fault detector	MV network characteristics	Mains frequency	50 or 60 Hz	Choice of mains frequency. Default: 50 Hz.
	Voltage measurement configuration	Transformer primary ratio	100–36000	Primary transformation ratio of PT. Default: 230.
		Transformer secondary ratio	100, 110, 115, 120 100/√3, 110/√3, 115/√3, 120/√3 200, 220, 230, 240 200/√3, 220/√3, 230/√3, 240/√3	Secondary transformation ratio of PT. Default: 230.
		Configuration of voltage sensors	U21 U21_U32 U21_U32_U13 V1 V1_V2 V1_V2_V3	Choice of sensor mode for voltage measurement. Depends on the type of arrangement (star or delta). Default: U21.
		Voltage rating	20–36000 V	Network voltage rating. Default: 230 V.
		Voltage present threshold	70–120%	Minimum threshold for validation of voltage presence. Default: 90%.
		Voltage absent threshold	5–95%	Maximum threshold for validation of voltage absent. Default: 80%.
		Residual voltage	5–95%	Min. phase-to-phase imbalance threshold for taking into account a voltage fault. Default: 30%.
		Voltage present time-out	100–180000 ms	In 10 ms increments. Minimum voltage presence time for taking into account voltage presence. Default: 100 ms.
		Voltage absent time-out	100–180000 ms	In 10 ms increments. Minimum voltage absence time for taking into account voltage absence. Default: 100 ms.
Measurements / fault detector	Current measurement configuration	Transformer primary ratio	50–2500	Primary transformation ratio of current transformers. (default: 500).
		Transformer secondary ratio	1 or 5	Secondary transformation ratio of current transformers. Default: 1.
		Current sensors	I1,I2,I3 or I1,I3,I0	Type A arrangement (3 phases) or type B (2 phases + homopolar – type PM6). Default: I1,I3,I0.
	Event detection configuration	I max. threshold	10–800 A	Phase event detection threshold. Default: 500 A.
		I0 threshold	2–160 A	Ground event detection threshold. Default: 20 A.
		Time delay for taking into account Imax	40–800 ms	Time for taking into account Imax fault. Default: 200 ms.
		Time delay for taking into account I0	40–800 ms	Time for taking into account I0 fault. Default: 200 ms.
		Inrush	Checked or not	Use of the Inrush function or not. Default: not checked.
		Reset upon voltage return	Checked or not	If checked, event detection storage resetting upon voltage return. Default: checked.

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Table 35: Configuration Options—Settings Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Measurements / fault detector (continued)	Event detection configuration (continued)	Time delay for resetting upon voltage return	0–70 s	In 1s increments. Voltage presence time for resetting the fault storage memory. Default: 3 s.
		Detector reset time delay	1–12 h	Time to reset the fault stored in memory automatically, if still present. Default: 2 h.
	Power supply functions	Time-delayed under voltage indication delay	0–21600 s	In 15 min. increments. Time delay for filtering the power supply undervoltage signal supplied by the power supply card. Allows indication of extended mains power supply malfunction. Default: 7200 s.
		Save		Allows the configuration to be taken into account
Variable configuration Control configuration	General parameters	Variable name	No restriction	Name given to variable.
		Type	Single or double	TCD = double control only
		Access	Administrator Operator Monitoring	Access right for this variable. The variable will be readable or modifiable depending on the type of access configured and the associated access rights.
		Order	Reverse or normal	The reverse choice reverses the order of the control bits for the TCD and the double telesignal (TSD) in the protocol frame to the Supervisor. E.g.: TCD and TSD on normal: bit 1 = opening, bit 2 = closing TCD and TSD on reverse: bit 1 = closing, bit 2 = opening (default: Normal)
		Class	(Complete list of all classes defined)	Allows a variable to be assigned to an existing class.
		Logical address		TCD internal No. assigned automatically by the T200 P (unmodifiable)
		Internal address		Address for the COM-CPU internal Modbus link (unmodifiable)
		Associated logical address TS	TSD1 to TSD40 or none	No. of the TSD associated with the TCD used by the T200 P for reading the state.
		External address	Format 'x' (e.g., 1) for all protocols except: - Modbus: 'x,x' (word, bit) - DNP3: 'x,x' (word, class)	External address used for retransmission of this TCD variable in the protocol link to the Supervisor.
		Save		Allows the configuration to be taken into account
		Cancel		Enables return to the preceding configuration
Variable configuration Indications configuration	Global parameters	Variable name	No restriction	Name given to variable.
		Type	Single or double	TSD = double information TSS = single information
		Logical address		TSD internal No. assigned automatically by the T200 P (unmodifiable)
		Class	(Complete list of all classes)	Allows a variable to be assigned to an existing class.
		Access	Administrator Operator Monitoring	Access right for this variable. The variable will be readable or modifiable depending on the type of access configured and the associated access rights.
		Internal address		Address for the COM-CPU internal Modbus link (unmodifiable)
		External address	Format 'x' (e.g., 2)	External address used by SCADA for this variable
		State definition: Active (1)	No restriction	Name displayed for an active state of the variable
		State color: Active (1)	Black, blue, green or red color	Display color for an active state of the variable
		State definition: Inactive (0)	No restriction	Name displayed for an inactive state of the variable
		State color: Inactive (0)	Black, blue, green or red color	Display color for an inactive state of the variable
		Other state: Undefined	No restriction	Name displayed for an undefined state of the variable (only with TSD and not with TSS)

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Table 35: Configuration Options—Settings Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Variable configuration Indications configuration (continued)	Global parameters (continued)	State color: Undefined	Black, blue, green or red color	Display color for an undefined state of the variable (only with TSD and not with TSS)
	Recording configuration	Enable	Checked or not	Enabling of the record or not upon change of state of this variable in the event log
		Upon any change of state (TSD) or upon active (TSS)	Checked or not	Saving of the event upon any change of state of the variable (TSD) or upon appearance of the active state (TSS)
		Upon loss of closing (TSD) or upon inactive (TSS)	Checked or not	Saving of the event upon disappearance of the closed state of the variable (TSD) or upon appearance of the inactive state (TSS)
	Alarm configuration	Enable	Checked or not	Enabling of the alarm or not upon change of state of this variable and saving in the alarm log.
		Upon any change of state (TSD) or upon active (TSS)	Checked or not	Activation of the alarm and saving of alarm upon any change of state of the variable (TSD) or upon appearance of the active state (TSS)
		Upon loss of closing (TSD) or upon inactive (TSS)	Checked or not	Activation of the alarm and saving of alarm upon disappearance of the closed state of the variable (TSD) or upon appearance of the inactive state (TSS)
		Alarm level	Scada + sms Scada sms	Several possible actions in the event of a retransmission of alarm depending on the defined level.
		Time-delayed alarm	Checked or not	Activates a time delay before sending the alarm.
		Delay value	0–99	Number of hours, minutes or seconds for the delay before sending the alarm to the SCADA
		Hours or Minutes or Seconds	Checked according to choice	Choice of unit for the value of the alarm delay
		Save		Allows the configuration to be taken into account
		Cancel		Enables return to the preceding configuration
Variable configuration Measurement configuration	General parameters	Variable name	No restriction	Name given to variable.
		Correction coefficient	Direct or raw or Direct/10 to direct/10000 or Direct*10 to direct*10000	Definition of a coefficient of multiplication to be applied to the measurement variable for its correct display in the monitoring page. Allows display in the correct format relative to the real size Default for T200 P series 3: current = direct/10 and voltage = direct Default for T200 P series 1 or 2 or L500 compatibility: current = direct and voltage = direct*100
		Logical address		TM internal No. assigned automatically by the T200 P (unmodifiable)
		Class	(Complete list of all classes)	Allows a variable to be assigned to an existing class.
		Access	Administrator Operator Monitoring	Access right for this variable. The variable will be readable or modifiable depending on the type of access configured and the associated access rights.
		Internal address		Address for the COM-CPU internal Modbus link (unmodifiable)
		External address (SCADA)	Format 'x' (e.g., 2)	External address used by SCADA for this variable
		Unit	No restriction	Unit for display of the variable
		Max. value	Integer	Maximum value that can be taken in practice by the measurement value. NB: The value configured influences the precision of the measurement.
		Min. value	Integer	Minimum value that can be taken in practice by the measurement value. NB: The value configured influences the precision of the measurement.
	Regular processing	Recording	Checked or not	Enabling of regular saving of the measurement in the measurement log or not.
		Period	15 min., 30 min., or 1 h	Measurement recording period
		Type	Averaged or sampled	Way of calculating the measurement for recording in the measurements log

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Table 35: Configuration Options—Settings Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Variable configuration Measurement configuration (continued)	Regular processing (continued)	Event	Checked or not	Enabling of regular saving of the measurement in the protocol event stack or not.
		Call	Checked or not	Enabling of regular sending of the alarm to SCADA and saving in the alarm log or not.
		Period	15 min., 30 min., or 1 h	Event or call saving period.
	Processing on threshold	Recording	Checked or not	Enabling of saving of the measurement in the measurements log or not upon exceeding threshold
		Event	Checked or not	Enabling of saving or not upon exceeding the measurement threshold in the protocol event stack.
		Call	Checked or not	Enabling of sending of the alarm to SCADA and saving in the alarm log or not upon exceeding threshold.
		High threshold	Checked or not	Enabling of high threshold or not
		Low threshold	Checked or not	Enabling of low threshold or not
		High threshold value	No restriction	Value for enabling exceeding of the high measurement threshold
		Low threshold value	No restriction	Value for enabling exceeding of the low measurement threshold
	Dead band	Recording	Checked or not	Enabling of recording of the measurement in the measurements log or not through variation
		Event	Checked or not	Enabling of regular saving or not upon variation of the measurement in the protocol event stack.
		Call	Checked or not	Enabling of sending of the alarm to SCADA and saving in the alarm log or not following measurement variation.
		Method	Fixed or percentage	Fixed: A fixed change in the value of the variable results in an associated processing operation (saving, alarm). Percentage: A change in percentage of the variable results in an associated processing operation.
		Value	0 to Max. scale value	Fixed value or % measurement variation for dead band processing
		Minimum change	0 to Max. scale value	Minimum change in the measurement variation for the dead band to be processed
	Min. and Max. recording	Active maximum	Checked or not	Recording or not of the maximum measurement reached over the period configured
		Active minimum	Checked or not	Recording or not of the minimum measurement reached over the period configured.
		Period	1, 7, or 14 days	Calculation period for min. and max. value
		Save		Allows the configuration to be taken into account
		Cancel		Enables return to the preceding configuration
Variable configuration Counters	General parameters	Variable name	No restriction	Name given to variable.
		Correction coefficient	Direct or raw or Direct/10 to 10000 or Direct*10 to 10000	Definition of a coefficient of multiplication to be applied to the counter variable for its correct display in the monitoring page. Allows display in the correct format relative to the real size Default for T200 P series 3: current = direct/10 and voltage = direct Default for T200 P series 1 or 2 or L500 compatibility: current = direct and voltage = direct*100
		Logical address		CNT internal No. assigned automatically by the T200 P (unmodifiable)
		Class	(Complete list of all classes)	Allows a variable to be assigned to an existing class.
		Access	Administrator Operator Monitoring	Access right for this variable. The variable will be readable or modifiable depending on the type of access configured and the associated access rights.
		Internal address		Address for the COM-CPU internal Modbus link (unmodifiable)
		External address (SCADA)	Format 'x' (e.g., 2)	External address used by SCADA for this variable
		Unit	No restriction	Unit for display of the variable

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Table 35: Configuration Options—Settings Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
Variable configuration Counters (continued)	General parameter (continued)	Max. value	Integer	Maximum value that can be taken in practice by the counter value. NB: The value configured influences the precision of the counter.
		Min. value	Integer	Minimum value that can be taken in practice by the counter value. NB: The value configured influences the precision of the counter.
		TCD reset address	TCD 1 to 40	Address for the counter reset command.
	Internal counting	Type of object	Digital or Analog	Selection of the variable type on which the counter is incremented
		Object	TSSxx or Dixx or TMxx or AIxx	Name of the variable to which the counter is assigned
		Counting method	Pulse counter - Time counter - Integrating meter	Depending on the type of object, the methods displayed are as follows: For a DI type variable: - Pulse counter. - Time counter. - Integrating meter. For an AI/AO type variable: - Integrating meter. - “Mean” counter.
		Pulse width	0–2000 ms	In 10 ms increments. Pulse length (in ms) after which the T200 P will consider a state as high.
		Inhibition after reset	0–2000 ms	In 10 ms increments. Period during which the T200 P inhibits pulse detection after zero crossing by the variable. This filter makes it possible to avoid possible rebounds in the event of a return to zero.
		Integration period	0–86400 s	Useful period of the measurement in the case of an integrating meter (DI type variable) or mean (AI type variable)
		Conversion factor	0–10000	Used in the case of a pulse counter. Weight of the pulse sent. With each pulse sent, the counter value is incremented in accordance with the conversion factor.
		Active state	Low or High	Field used only in the case of a time counter. State of the variable (high or low) which activates the time counter.
	Regular processing	Recording	Checked or not	Enabling of regular recording of the counter in the measurement log or not.
		Event	Checked or not	Enabling of regular saving of the counter in the protocol event stack or not.
		Call	Checked or not	Enabling of regular sending of the alarm to SCADA and saving in the alarm log or not.
		Period	15 min., 30 min., or 1 h	Counter recording period.
	Processing on threshold	Recording	Checked or not	Enabling of recording of the counter in the measurements log or not upon exceeding threshold
		Event	Checked or not	Enabling of saving or not upon exceeding the counter threshold in the protocol event stack.
		Call	Checked or not	Enabling of sending of the alarm to SCADA and saving in the alarm log or not upon exceeding threshold.
		Value	No restriction	Value for enabling exceeding of the high counter threshold.
	Dead band	Recording	Checked or not	Enabling of saving or not upon counter variation in the measurement log.
		Event	Checked or not	Enabling of saving or not upon counter variation in the protocol event stack.
		Call	Checked or not	Enabling of sending of the alarm to SCADA and saving in the alarm log or not following counter variation.
		Value as %	0–255	% variation of the counter for the dead band criterion.
		Save		Allows the configuration to be taken into account.

Continued on next page

Table 35: Configuration Options—Settings Page *(continued)*

Sub-page	Section	Parameter / Button	Configuration Range	Comments
		Cancel		Enables return to the preceding configuration.
Class management		Recycle bin	Checked or not	Selection of class to be deleted or not
		Monitoring	Checked or not	Selection or not of class display in the Monitoring page
		Class name	No restriction	Class name to be displayed
		Save		Allows a modification or a creation to be recorded for each class
		Delete		Allows a class that has been selected earlier to be deleted

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Appendix B—
General Characteristics

Table 36: General Characteristics

Capacity			
	Controllable switch		1 channel (2 channels on option)
	Indication inputs		Open door + 8 free digital inputs
	Output loops		Enclosure lighting + 3 digital outputs
Power supply			
AC supply	Characteristics		230 Vac, 50 Hz, 120 VA protected by HRC fuse of 4 A rating, type gF Permissible mains voltage: 90–270 Vac (43 V and 57 V on option).
Power supply	Charger	12 V	7 A
	Rack power supply		12 Vdc (10.8 V to 14.8 V). Protected by a 0.8 A fuse
	Telecommunications		12 Vdc (10.8 V to 14.8 V) 1 A continuous-duty, 7 A max. Protection if current > 1.3 A for more than 3 min.
	Motorization	48 V (or 24 V on option)	By 12/48 V converter (12/24 V on option) 48 Vdc (44.8 V to 59 V) max. 6 A during 12 s and 15 A during 50 ms
Battery	Type		Sealed lead maintenance-free type
	Charging time		10 h to 24 h
	Capacity		12 Vdc – 38 Ah
	Monitoring		Total discharge, periodic tests every 12 hours (10 A during 100 ms). Successful test if U Bat.> 11,2V, at the end of the test. Two consecutive unsuccessful tests generate battery fault
	Power reserve	at 20 °C	Up to 16 h + 10 open/close cycles (in radio communications)
	Service life	at 20 °C	10 years
Characteristics			
Dielectric	AC supply input	IEC 60 255-4	Insulation (50 Hz/1 min.): 10 kV Impulse wave (1.2 / 50 µs): 20 kV
	Current transformer input	IEC 60 255-4	Insulation (50 Hz/1 min.): 2 kV Impulse wave (1.2 / 50 µs): 5 kV
Electromagnetic	Rapid transients	IEC 61 000-4-4	Level 4: 4 kV (mains and sensors), 2 kV (other circuits)
	Electrostatic discharges	IEC 61 000-4-2	Level 3; 6 kV on disconnected 8 kV contact
	Radiated electromagnetic field	IEC 61 000-4-3	80 MHz – 1 GHz – 30 V/m
	Radio frequency on FSM	IEC 61 000-4-6	0.15 MHz to 80 MHz – 10 V rms
	Damped oscillatory waves	IEC 61 000-4-12	2.5 kV common mode, 1 kV differential mode
	Pulsed magnetic field	IEC 61 000-4-9	1000 A/m peak
	Impulse waves	IEC 61 000-4-5	Coupling between line wires 1 kV, between wire and frame ground 2 kV
	50 Hz magnetic fields	IEC 61 000-4-8	30 A/m continuous-duty and 300 A/m 1 to 3 s
Climatic	Temperature		–25 °C to +55 °C
	Relative humidity	IEC 60 68-2-3	Less than 95% at 40 °C
	Salt spray test	IEC 60 68-2-11	336 h
	Storage temperature	IEC 60 68-2-14	–40 °C to +70 °C
Mechanical	Enclosure material		316L stainless steel
	Vibrations	IEC 60 68-2-6	10 to 500 Hz; 1 g or 0.075 min., peak-to-peak
	Dimensions	H x L x D	630 mm x 410 mm x 350 mm
	Weight		40 kg
	Protection	IEC 60529	IP55

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Table 36: General Characteristics *(continued)*

Measurements (options)			
Current measurement and event detection	Phase-to-phase fault threshold		Configurable, 10–800 A in increments of 1 A
	Ground fault threshold		Configurable, 2–160 A in increments of 1 A
	Fault duration		40–800 ms in increments of 1 ms
	Values returned		3I, Imean, Io
	Precision (excluding sensors)	–10 °C to 55 °C	1.6%, 20–800 A
Voltage measurements	Values returned		3Ø and 3 V
	Precision (excluding sensors)	–10 °C to 55 °C	1.2 % (0.5 % at +20 °C)
Other measurements	Power	–10 °C to 55 °C	P, S, Q: precision 2.8%
	Energy	–10 °C to 55 °C	Precision 2%
	Power factor	–10 °C to 55 °C	Precision 1.7%
	Frequency		Mean value over 10 periods; precision 0.1%
	Measurement of phase shift between two Ø measurements	–10 °C to 55 °C	Expressed in degrees; precision ± 3 °C
General characteristics	Digitizing		12 bits

Appendix C—Acronyms

Acronym	Description
APN	Access Point Name
ATS	Automatic Transfer of Source
BVE	External Light Box (French: Boitier Voyant Extérieur
CD	Carrier Detect
CD-ROM	Compact Disc Read-Only Memory
CF	Closing control
CNT	Counter
CO	Opening control
COM	Communication
CPU	Central Processing Unit
CR	Command Result
CRC	Cyclic Redundancy Check
CTS	Clear To Send
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DOUT	Digital OUTput
DSR	Data Send Ready
DTR	Data Terminal Ready
EMC	Electro Magnetic Compatibility
F	Closed position
FFSK	Fast Frequency Shift Keying
FPI	Fault Passage Indicator
FSK	Frequency Shift Keying
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communications
HTML	HyperText Markup Language
IP	Internet Protocol
LAN	Local Area Network
LED	Light Emitting Diode
LL	Leased Line
MAC	Media Access Control
MF	Multifrequency
MV	Move
O	Open position
PIN	Personnal Identification Number
PPP	Point-to-Point Protocol
PSTN	Public Switched Telephone Network
RTS	Request To Send
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SEC	Sectionalizer
SIM	Simulation
SMS	Short Message Service
SNTP	Synchronized Network Time Protocol
TCD	Double command
TCP/IP	Transmission Control Protocol (TCP) and Internet Protocol (IP)
TM	Tele Measurement
TSD	Double signalization
TSS	Single signalization
UMPC	Ultra Mobile Personal Computer
USB	Universal Serial bus
VT	Voltage Time

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